Avoidable Mortality in Cumbria - A Review of 73 Fatal Road Traffic Collisions

April 2015

Rachel E Brown

Acknowledgements

The author would like to thank the following people from Cumbria Constabulary Collision Investigation Unit: Inspector Phil Davidson, Sergeant Graeme Hodgson, PC Diane Bowman, PC Mark Dempster, PC Ian Hanson, PC Craig Irving, PC Mark Andrew Jordan, PC Mike Lazonby, PC Shaun McKeown, PC Phil Murray, PC Steven Wakefield, PC Richard Wiejak, and Inspector Joanne House.

Thanks also to Colin Cox, Claire King, Dr Jane Mathieson, and Chris Broadbent from Cumbria County Council, and Dr Gordon Hay and Dr Hannah Timpson from the Centre of Public Health.

Centre for Public Health
Liverpool John Moores University
Henry Cotton Building
15-21 Webster Street
Liverpool
L3 2ET

Telephone: 0151 231 4542

Email: r.e.brown@ljmu.ac.uk

Website: www.cph.org.uk

Table of Contents

List of Figures

List of Tables

Definitions and Terminology

Confidence Interval

A confidence interval is a range of values that is used to quantify the imprecision in the estimate of a particular value (e.g. directly standardised rate). Statistical significance is assigned on the basis of non-overlapping confidence intervals. Whilst there are more formalised and accurate methods of significance testing, the non-overlapping method is used as it is both simple and easily understood.

Crude Rate

A crude rate is a rate that applies to the population as a whole, and that has not been adjusted to account for differences in population structures such as age and sex. It is calculated using the following formula: *Crude rate = number of events/total number of people in the population.*

Deprivation Quintile

Deprivation quintiles divide areas into fifths according to the National Index of Multiple Deprivation scores, and are used to analyse variation between deprived and affluent sections of the population. Quintile 1 refers to the most deprived 20% of areas nationally, while quintile 5 refers to the least deprived 20% of areas nationally.

Driver

A person in control of a car, medium goods vehicle, or large goods vehicle. Does not include a person in control of a motorcycle or bicycle.

Directly Standardised Rate

A directly standardised rate gives an indication of the number of events that would occur in a standard population, if that population had the same age-specific rates of the local area. The standard population used within this report is the European Standard Population (2013 version). These rates are calculated per 100,000 and allow comparison across areas and by sex.

European Standard Population

The European Standard Population is an artificial population structure (equating to 100,000) which is used to calculate directly standardised rates. The European Standard Population used

in this report is the 2013 version which takes into account the significant changes to the age distribution of population across Europe since the 1976 version.

Fatal Road Traffic Collision

A fatal road traffic collision is where a death occurs in less than 30 days as a result of a collision. A fatal RTC does not include death from natural causes or suicide.

Index of Multiple Deprivation

The Index of Multiple Deprivation is a UK government study of deprived areas in local councils which covers seven aspects of deprivation: income, employment, health deprivation and disability, education skills and training, barriers to housing and services, crime, and living environment.

Large Goods Vehicle

A goods vehicle in excess of 7.5 tonnes.

Medium Goods Vehicle

A goods vehicle of between 3.5 and 7.5 tonnes.

Passenger

A person other than the driver travelling in a car, medium goods vehicle, or large goods vehicle.

Percentage

A percentage is a measure of a portion in relation to a whole, expressed in relation to how many of something there are per 100.

Rider

A person riding a motorcycle or bicycle.

Speed-related Collision

The term speed-related collision in this report encompasses both 'excess speed' (where a vehicle exceeds the relevant speed limit) and 'inappropriate speed' (where a vehicle travels at a speed that is unsuitable for the prevailing road and traffic conditions).

Statistical Significance

Within this report, a difference which is described as being 'statistically significant' has been assessed using confidence intervals (see confidence interval definition). If the confidence interval around a value overlaps with the interval around another, there is no significant difference between the two values.

Potential Years of Life Lost (PYLL)

Potential years of life lost (PYLL) is a measure of the potential number of years lost when a person dies prematurely (under the age of 75) from any cause.

Abbreviations

BEEP - Birbeck Emergency Equipment for Patients

DfT – Department for Transport

DH – Department of Health

DVLA – Driver and Vehicle Licensing Agency

DVSA – Driver and Vehicle Standards Agency

GNAA – Great North Air Ambulance

HGV – Heavy Goods Vehicle

HRO – High Risk Offenders

KSI – Killed or Seriously Injured

LGV – Large Goods Vehicle

MGV – Medium Goods Vehicle

MOJ – Ministry of Justice

NICE – National Institute for Health and Care Excellence

PHE – Public Health England

PHOF – Public Health Outcomes Framework

PYLL – Potential Years of Life Lost

RTC – Road Traffic Collision

WHO – World Health Organisation

1. Executive Summary

This report presents a retrospective review of 73 fatal road traffic collisions (RTCs) which occurred in Cumbria during 2012 and 2014 that resulted in 78 deaths and 2,120 potential years of life lost (PYLL). The data was compiled from collision investigation reports produced by Cumbria Constabulary's Collision Investigation Unit. To develop effective prevention programmes in Cumbria, the factors associated with fatal RTCs must be identified and understood. The intelligence within this report is therefore intended to support local decision-making and inform the development of local plans to reduce the risk of death from RTCs in the county.

Collision investigators attend each serious and potentially fatal RTC that occurs in the county. The files which are prepared by the collision investigators include photographs of the collision scene, witness statements, maps and diagrams, toxicology results, and their findings which are then compiled into a report. On average, a collision investigator in Cumbria arrives at the scene in 1 hour and 08 minutes following the collision.

At the time of writing, 55 inquests had been held in relation to the fatal RTCs included within this report, resulting in a coroner's verdict. The most common verdict delivered was 'road traffic collision' (*n*.27, 35%) closely followed by 'accidental death' (*n*.15, 31%). There was also 1 verdict of misadventure and 1 narrative verdict delivered and in 2 cases the inquest verdict was unknown. There were 8 cases where the inquest was still pending. The remaining 15 cases had been passed to the Crown Prosecution Service (CPS).

Key Points:

- The average age of those killed in an RTC was 48 years.
- More males died compared to females (79% and 21% respectively).
- Residents of Allerdale accounted for the highest proportion of fatalities at 27%.
- Car drivers made up the highest share of road deaths at 38%, followed by motorcyclists at 23%. This compares to 46% and 19% respectively in the UK in 2013.
- Multiple injuries were the most common cause of death at 47%.
- The majority (67%) of individuals die at the scene of the collision.
- The highest proportion of RTCs occurred in South Lakeland (29%) followed by Allerdale (22%) and Eden (21%).

- The majority of fatal RTCs occur on the county's A-roads (62%), particularly, the A595, the A6, and the A66.
- 29 (37%) people were killed in an RTC in which excess or inappropriate speed was a contributory factor. Motorcyclists and younger drivers (aged 17-25) were often involved in these collisions.
- 20 (26%) people were killed in an RTC that involved alcohol and/or drugs. The average blood alcohol level was 162 mg/ml (i.e. twice the UK legal driving limit).
- 7 (9%) people were killed in an RTC where fatigue was a contributory factor.
- 18 motorcyclists were killed, accounting for 23% of road deaths. The average age was 43 years.
- 18 people were killed in an RTC involving a younger driver (aged 17-25), accounting for 23% of road deaths.
- 18 people were killed in an RTC involving an older driver (aged 65+), accounting for 23% of road deaths.
- 13 pedestrians were fatally injured, accounting for 17% of road deaths.
- The review was able to highlight cases where medical conditions played a role in the RTC.

It is proposed that the findings and recommendations of this review be shared with and distributed to relevant organisations and stakeholders. For example, the Cumbria Health and Wellbeing Board, Cumbria Public Health Alliance and the six Health and Wellbeing Forums, the Cumbria Road Safety Partnership, and Cumbria Constabulary. The findings could also be used to inform Cumbria's Joint Strategic Needs Assessment.

Recommendations:

- Given that speed and alcohol and/or drug use are the two major contributory factors in fatal RTCs in Cumbria, any existing prevention efforts in this area should be continued with an increased stress on road user groups about the risk of fatality caused by speeding and/or driving/riding whilst impaired through alcohol and drugs.

- Given that a high proportion of fatalities linked to speed and alcohol and/or drug use occur at night and among younger drivers, consider collaboration with pubs/bars to develop and deliver educational interventions in relation to speed and impairment.

In addition, locality public health leads (once in post) could explore ways in which to distribute the findings from the review to local colleges and sixth form schools.

- Motorcyclists should continue to be a target group for road safety advice. Interventions in place should inform motorcyclists of the risks of speeding, both from an educational and road-based enforcement perspective. The results and information within this report could be used as examples to deter motorcyclists from travelling at inappropriate and/or excess speed.

- If not already in place, investigate the effectiveness of signage and/or speed enforcement interventions in motorcycle fatality hotspot areas.

- Continue local evaluation of the BikeSafe initiative to ensure that 'vulnerable' groups of motorcyclists are aware of and attending the scheme. Whether participants find the programme useful it and encourages them to ride more safely should also be assessed. If not already covered, the programme may benefit from focusing on 'attitudes' to riding and riding 'behaviour'.

- Observation and misjudgement were the most common reasons for fatalities amongst older people. Consider working with third sector providers of services for older people as an avenue for promoting education and information messages amongst this age group.

- Ensure that the local 'Drive Safely for Longer' scheme is promoted and evaluated, and that the assessment and hand-out cover the issues highlighted in this report as risks for the older population.

- Ensure that GPs and health professionals are aware of their role within road safety, particularly in relation to the medication and medical conditions they need to inform the DVLA of, and that they promote this amongst their patients (of all ages). A summary report could be produced for the Clinical Commissioning Groups (CCG) across Cumbria for discussion.
- Explore the potential to collate information from collision investigation reports on a regular basis to inform and target prevention efforts. In addition to fatal RTCs, this could also include information relating to serious RTCs.

2. Introduction

The World Health Organisation (WHO) highlight that mortality resulting from RTCs is a global public health concern.[1] At the inquest into the world's first road traffic death in 1896, the coroner was reported to have said "this must never happen again", however more than a century later there are approximately 1.2 million deaths occurring annually on the world's roads.[1] Current trends suggest that by 2030 road traffic deaths will become the fifth leading cause of death worldwide.[2]

Fatal RTCs are considered to be preventable and can be avoided through improved education, awareness, road infrastructure and vehicle safety.[3] On 25 July 2013 the road traffic collision verdict was introduced, thus reinforcing the notion that road deaths are preventable rather than accidental as road deaths were traditionally classified as 'accidents' in the coroner court.[4] Given that RTCs are now widely recognised as an avoidable cause of death, this report uses the term 'collision' rather than 'accident' to describe incidents that result in a fatality on the road.

RTCs have a devastating effect on individuals and communities. In addition to the human cost of RTCs, they can also impose a massive financial burden through lost production, health-care, social benefits, and in personal pain, grief and suffering. Whilst the price paid by the victims of RTCs, their families, and the community is immeasurable, the Department for Transport (DfT) described the average monetary value of prevention of a fatal RTC in 2013 as £1,953,783 per collision, and that the average cost of an investigation for a fatal RTC was £17,279.[5]

As previously noted, RTCs are not solely a road safety problem; they are a public health problem. From a public health perspective, reducing the burden of road injury and mortality could contribute to an overall health improvement in Cumbria and help to tackle a serious health challenge in light of rising car ownership and traffic volumes. In essence, reducing serious and fatal RTCs has the potential to improve life expectancy, reduce morbidity and contribute to reducing local health inequalities.

In March 2013, the Department of Health (DH) released a call to action to reduce the number of avoidable deaths in England. The call to action states for local authorities to lead the change in reducing preventable early death supported by both Public Health England (PHE) and the National Institute for Health and Care Excellence (NICE).[6]

An overview of avoidable mortality in Cumbria revealed that avoidable mortality due to injuries (which includes fatal RTCs) was significantly higher compared to England in 2011 and contributed to 21% of total potential years of life lost (PYLL).[7] In light of these findings, Cumbria's Director of Public Health requested that a review of fatal RTC's be carried out, with a particular view to establishing a more detailed representation of the intelligence surrounding fatal RTC's in Cumbria. The intelligence within this report is therefore intended to support local decision-making and inform the development of local plans to reduce the risk of death from RTCs in the county.

3. Report Outline

Chapter 4 briefly describes the national road safety policy context which includes: the 'Making Roads Safer' policy, the 'Strategic Framework for Road Safety', and changes made to drug driving legislation.

Chapter 5 outlines the various statutory and voluntary agencies that are committed to road safety and who respond to serious and fatal RTCs in Cumbria.

Chapter 6 describes the two main sources of routinely available road fatality data: from STATS19 and the Health and Social Care Information Centre (HSCIC) indicator portal.

Chapter 7 provides an overview of STATS19 data at a national level and includes: the trend of RTC fatalities from 1991 to 2013, fatalities by road user type, the drink drive fatality trend, and common contributory factors in fatal RTCs.

Chapter 8 provides an overview of STATS19 data at a local level and includes: the trend of RTC fatalities from 2005 to 2013 and the trend according to urban and rural area type.

Chapter 9 gives an overview of the HSCIC data related to fatal RTCs. This data is based on the date of death registration and an individual's local authority of residence at the time of death, and therefore differs to STATS19 data.

The in-depth review of fatal RTCs in Cumbria using police collision investigation reports is presented in **chapter 10.** This includes the aims, methods, results, discussion, conclusion and

recommendations. The results are presented under the following subheadings: individual demographic characteristics, fatal RTC characteristics, common themes, fatal RTC hotspot areas, prevention of future death reports, STATS19 data errors, and medical conditions or disabilities.

4. National Policy Context Overview

4.1 Making Roads Safer

The DfT policy 'Making Roads Safer' was published in October 2012 and focusses on reducing RTCs through improved driving training, tougher drink/drug driving charges, road safety campaigns and lowering speed limits. The policy states that:

> *'by improving the skills and attitudes of drivers and riders, and providing better safety education, the government can further reduce the cost of emergency services, health and welfare services, insurance, traffic congestion, as well as the personal cost to people affected by road collisions'.*[8]

The actions outlined within the Making Roads Safer policy are focused on the following areas:

- Drink and drug driving.
- Speed limits.
- Cyclist safety.
- Road safety education for children.
- Motorcycle safety.
- Uninsured drivers.
- Driving and riding tests and standards.
- Driving and rider training.
- Training and assessment of instructors.

4.2 Strategic Framework for Road Safety

The DfT 'Strategic Framework for Road Safety' was published in May 2011.[3] The strategy draws together and updates the wide-range of issues that must to be addressed to reduce road casualties. The strategic framework has removed over-arching national targets in favour of a new proposed 'Road Safety Outcomes Framework'. The Road Safety Outcomes Framework is designed to help the Government, local organisations and local citizens to

monitor the number of fatalities and seriously injured casualties on Great British roads. The 6 indicators which relate to road deaths and will measure the outcomes of the strategy at a national level are:

- Number of road deaths (and rate per billion vehicle miles).
- Rate of motorcyclist deaths per billion vehicle miles.
- Rate of car occupant deaths per billion vehicle miles.
- Rate of pedal cyclist deaths per billion vehicle miles.
- Rate of pedestrian deaths per billion miles walked.
- Number of deaths resulting from collisions involving drivers under 25.[3]

At a local level, the number of road deaths is small and subject to random fluctuations, therefore the following indicators are used:

- Number of killed or seriously injured casualties
- Rate of killed or seriously injured casualties per million people
- Rate of killed or seriously injured casualties per billion vehicle miles.[3]

4.3 Drug Driving Legislation

In April 2013, the DfT brought in new legislation to prosecute drug driving in the Crime and Courts Act 2013, which inserts a new section 5A in the Road Traffic Act 1988. The new section 5A offence came into force on 2 March 2015 and increases the effectiveness of enforcement activity, with the overall intention of bringing more drivers under the influence of drugs to justice, deterring driving whilst impaired through drugs, and improving road safety.[9] The new legislation means that it is now an offence to be over a specified limit for certain drugs whilst driving and there are 16 different drugs with recommended limits, consisting of 8 general prescription drugs and 8 illicit drugs (details in appendix 1). These new regulations came in to force at the same time as new equipment to test drivers for cannabis and cocaine at the roadside became available to the police. If a driver tests positive they will be taken to a police station where a blood sample will be obtained for laboratory analysis. Once the sample results are returned, the individual will then either be charged with a drug driving offence or no further action will be taken.

5. Road Safety Agencies in Cumbria

5.1 The Cumbria Road Safety Partnership

The Cumbria Road Safety Partnership (CRSP) is comprised of a number of organisations who are committed to reducing avoidable death and injury on Cumbria's roads. The organisations consist of those who have a statutory responsibility and also those who have a specific interest. The CRSP was established in 2004 and they assist in the planning and implementation of initiatives and action plans which aim to reduce road casualties, including: community engagement, education and training, Cumbria Safety Camera Unit, police enforcement operations, local engineering safety schemes and speed limits, and communications/marketing.

The CRSP recently published their Annual Road Safety Plan for 2014/15 which states that the future priority for the CRSP is to influence behaviour in all road user groups.[10]

5.2 Cumbria Casualty Reduction and Safer Highways Group

Cumbria Casualty Reduction and Safer Highways (CRASH) is a multi-agency group which meets on a monthly basis. The main purpose of the CRASH group is to implement Cumbria's Annual Road Safety Plan, monitor and respond to local issues and community concerns, and to minimise risk and promote road safety at high risk events in occur within the county.

5.3 Cumbria Constabulary Collision Investigation Unit

Cumbria Constabulary's Collision Investigation Unit was formed in 1998 and is responsible for dealing with all fatal and potentially fatal RTCs throughout Cumbria working in conjunction with officers from the Roads Policing Unit. At the time of writing, Cumbria's Collision Investigation Unit operates with a team of 6 Collision Investigators and 1 Vehicle Examiner. This review found that the time taken for a Collision Investigator from Cumbria Constabulary to arrive at the scene of a fatal collision in Cumbria to carry out their investigation was, on average, 1 hour and 08 minutes.

5.4 Cumbria Constabulary Roads Policing Unit

Cumbria Constabulary's Road Policing Unit (RPU) consists of five operating bases that are spread geographically throughout the county. The RPU are responsible for patrolling approximately 4,800 miles of county road network and 62 miles of the M6 motorway from

Junction 35 to 45. One of the primary responsibilities of the RPU is to attend as a first response to any major incident occurring within the county, and to attend and deal with any fatal, potentially fatal, or serious injury RTC.

5.5 Cumbria Fire and Rescue Service

Cumbria Fire and Rescue Service operate from 39 fire stations located across the county. Two fire stations situated in Barrow and Carlisle are staffed 24 hours per day by Regular (full-time) firefighters. Workington and Whitehaven are also staffed by Regular firefighters 24 hours per day with additional support from On-Call (part-time) firefighters. Kendal and Penrith fire stations are both staffed during the day by Regular firefighters with an On-Call crew providing additional support during and outside of their daytime operating hours. A further 32 stations across the county are solely staffed by On-Call firefighters who live and/or work in the community they serve.

5.6 North West Ambulance Service

The North West Ambulance Service (NWAS) NHS Trust is the second largest ambulance service in the country, providing 24 hour, 365 days a year emergency medication treatment and transport.

5.7 North West Air Ambulance Charity

The North West Air Ambulance (NWAA) Charity has been operating for over 15 years, with a fleet of three Eurocopter EC135 helicopters which fly 365 days of the year. The NWAA cover 5,500 square miles and provide an urgent and lifesaving service to the people of the North West and its visitors.

5.8 Great North Air Ambulance: The Pride of Cumbria

The Pride of Cumbria is based in Langwathby and is one of the Great North Air Ambulance (GNAA) charity helicopters which began flying in 2011. The Pride of Cumbria is a Eurocopter Dauphin AS365 which can cruise at a speed of around 170 miles per hour (or 150 knots), and has a range of around three hours. The Pride of Cumbria works predominantly in Cumbria.

5.9 Birbeck Emergency Equipment for Patients (BEEP) Fund

The Birbeck Emergency Equipment for Patients (BEEP) Fund is a local charity and was established in 1994 to provide emergency medical treatment for victims of accidents in the Penrith area. The BEEP car attends all RTCs in the Penrith area (within a radius of 10-15 miles) as well as most other medical emergencies. BEEP has a team of seven trained doctors and they generally attend 150 medical emergencies per year, 75% of which are RTCs.

5.10 The Highways Agency, Cumbria County Council

At a serious or potentially fatal RTC the Highways Agency will attend the scene and can have a number of roles depending upon the circumstances. For instance a Highways Engineer will attend to assess the road condition and determine whether this is likely to have been a contributory factor in the collision. The Highways Agency may also be required to close the road and provide diversion routes for traffic. They also clear the scene and ensure that the road condition is satisfactory afterwards.

6. Sources of Road Fatality Data

6.1 STATS19

The DfT centrally collate all road collision and casualty data in Great Britain through a system known as STATS19. The STATS19 database holds information on each reported collision and its circumstances, such as the time and location of the incident, casualty severity, vehicle characteristics, and any environmental hazards. These data are collected at the scene of the collision by the attending police officer. At present, STATS19 is the most detailed, consistent, and complete source of data on road traffic collisions and casualties available.

6.2 Health and Social Care Information Centre (HSCIC)

The number of casualties killed and seriously injured (KSI) on English roads is included as an indicator in the Public Health Outcomes Framework (PHOF) under domain 1: improving the wider determinants or health. The data are available from the Health and Social Care Information Centre (HSCIC) indicator portal. The PHOF recognises that road safety can have implications for the safety of communities, the long-term costs to the health and social care system, and to the wider economy. The HSCIC use the data to calculate a rate of KSI per

100,000 population which can then be compared to other local authority areas across England.

It is important to note that the HSCIC data are based on the date of death registration rather than on the date of death or the date in which the RTC occurred. The HSCIC data are also based on area of residency; therefore any deaths of non-Cumbria residents would not be included in the Cumbria data, whereas the STATS19 is based on the location of the RTC and therefore includes deaths of non-residents in the Cumbria data. This is of particular importance as the results of the review show that almost one fifth of road deaths are among non-residents of Cumbria (chapter 10.3.1, table 2).

7. National Road Fatality STATS19 Overview

7.1 Road Traffic Collision Fatality Trend

The latest STATS19 statistics show that the number of reported road fatalities in Great Britain decreased by 2% between 2012 and 2013 from 1,754 to 1,713 deaths, the lowest figure since records began in 1926.[11] **Figure 1** illustrates the trend of road fatalities in Great Britain since 1991, since then the number of road fatalities has decreased by 63%. The reduction in road fatalities has become less pronounced in more recent years (since 2010).

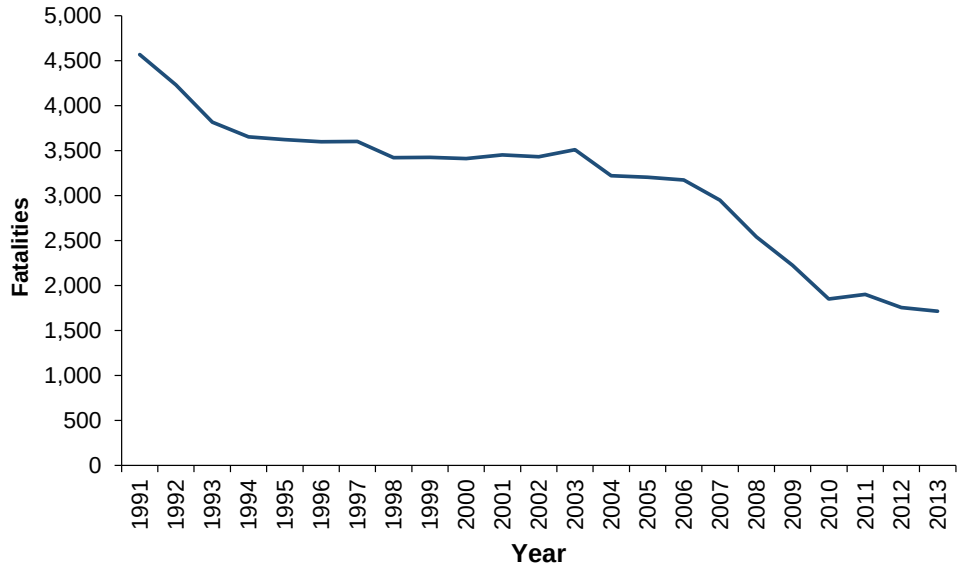

Figure 1: Trend of Road Fatalities in Great Britain, 1991 - 2013 *(Source: Department for Transport Statistics, Table RAS40001)*

7.2 Road Traffic Collision Fatalities by Road User Type

In 2013, as in previous years, **car users** made up the biggest share of road deaths with figures showing that in total there were 785 fatalities of car occupants, representing 46% of all fatalities.[12] However, when adjusted for the relative distance travelled, the fatality rate for car occupants is in fact amongst the safest compared to other road user groups (**table 1**).

Pedestrian fatalities accounted for 23% of all road fatalities in 2013. The number of pedestrian fatalities in 2013 was 398 and this was a 5% decrease from the previous year.[12]

In 2013, **motorcyclist** fatalities accounted for 19% of all road fatalities. The number of motorcyclist fatalities in 2013 was 331; this was a 1% increase from the previous year.[12] As shown in **table 1**, when adjusted for the relative distance travelled, the fatality rate for motorcyclists was the highest compared to other road user groups at 118.6 deaths per billion vehicle miles.

Pedal cyclist fatalities accounted for 6% of all road deaths in 2013. Between 2012 and 2013 the number of cyclist fatalities has decreased by 8% from 118 to 109. Trend data does shows a long-term decrease; however pedal cyclist fatalities have fluctuated between roughly 100 and 120 over the last six years.[12]

Table 1: Fatality rate per billion vehicle miles in Great Britain by road user group, 2013 *(Source: Department for Transport Statistics, RAS30070)*

Road user group	Rate per billion vehicle miles
Car driver	2.3
Pedestrian	34.1
Pedal cyclist	33.9
Motorcyclist	118.6

7.3 Drink Drive Fatalities

The most recent statistics relating to drink drive fatalities are for RTCs that occurred in 2012 and show that there were 230 drink drive deaths in total. The number of drink drive deaths has remained somewhat stable since 2010 (between 230 and 240), and a 40% decrease was recorded between 2009 and 2010.[12]

The proportion of drivers and riders killed, where a blood alcohol level was found to be over the legal limit was 18% in 2012 (**figure 2**). As also illustrated in **figure 2**, 6% of killed

motorcyclists and almost a quarter (24%) of vehicle drivers were found to be over the legal alcohol limit when they died. The trend shows that these proportions have fluctuated over the last 20 years, but without any significant upwards or downwards trend. It is likely that the overall decrease in the number of road fatalities (**figure 1**) has contributed accordingly to a fall in the number of drink drive deaths.

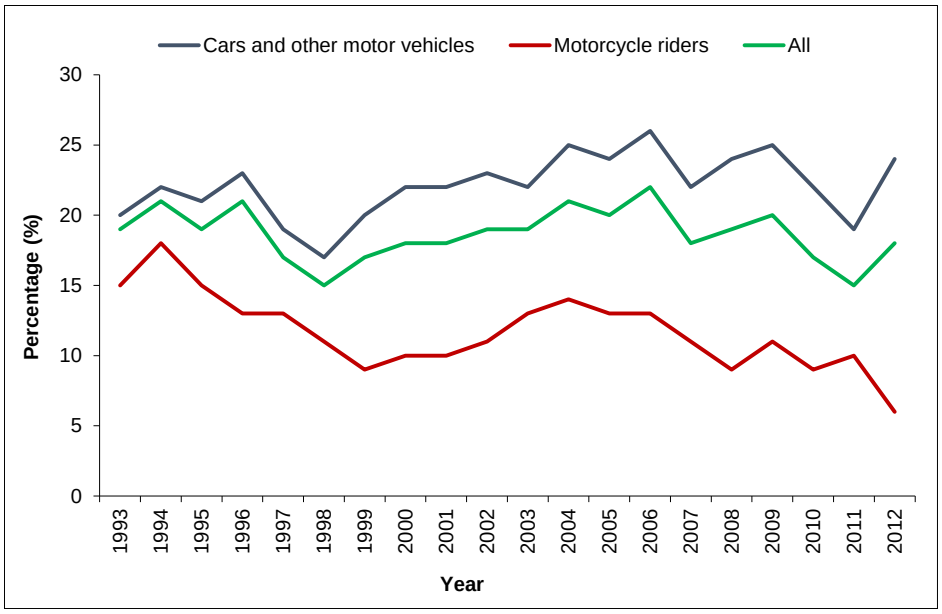

Figure 2: Percentage (%) of drivers and riders killed who were over the legal blood alcohol limit, Great Britain, 1993 – 2012 *(Source: Department for Transport Statistics, RAS51006)*

7.4 Common Contributory Factors

The most common contributory factor reported in fatal RTCs in 2013 was **"loss of control"**; this was recorded in 34% of collisions, whilst **"driver/rider failed to look properly"** was recorded in 26% of fatal RTCs.[12]

8. Cumbria Road Fatality STATS19 Overview

8.1 Road Traffic Collision Fatality Trend

The most recent STATS19 statistics report that there were 27 fatalities in Cumbria during 2013, accounting for 1.6% of all road traffic casualties in the county. Over the last 9 years the number of fatalities in Cumbria has decreased by 40%, however over the last 4 years the number has remained similar (**figure 3**).

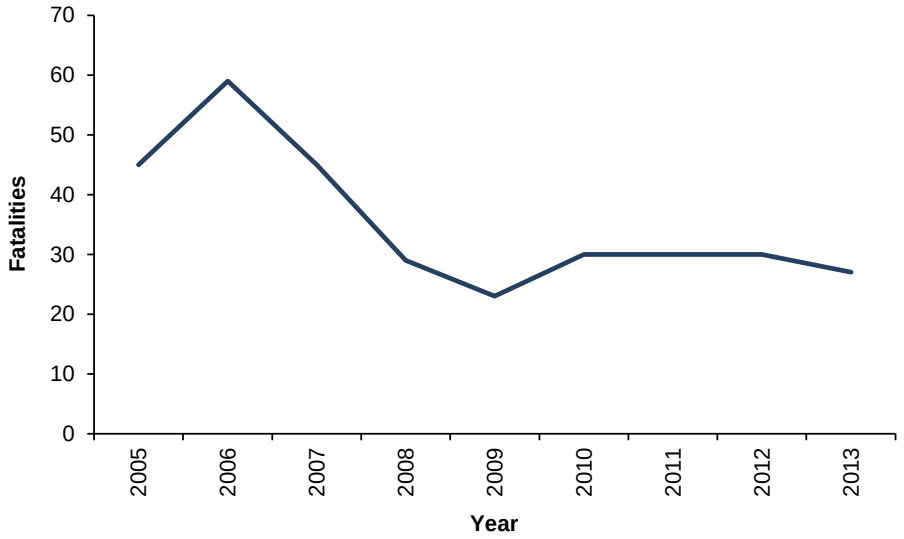

Figure 3: Trend of Road Fatalities in Cumbria, 2005 - 2013 *(Source: Department for Transport Statistics, RAS30043)*

8.2 Fatal Collisions in Urban-Rural Areas

The rate and severity of RTCs vary between urban and rural driving environments. In general, RTCs are more frequent in urban areas due to greater traffic and population densities, however injury severity is greater in rural areas. It is likely that this is due to the slowing effects of road design and congestion in urban areas, whilst the conditions in rural areas can allow for travelling at greater speeds.[13] **Figure 4** illustrates the trend of the number of fatal RTCs per year in Cumbria between 2005 and 2013, according to urban-rural area classification of the collision location. This shows that the reduction in fatal RTCs in recent years has predominantly occurred in rural areas.

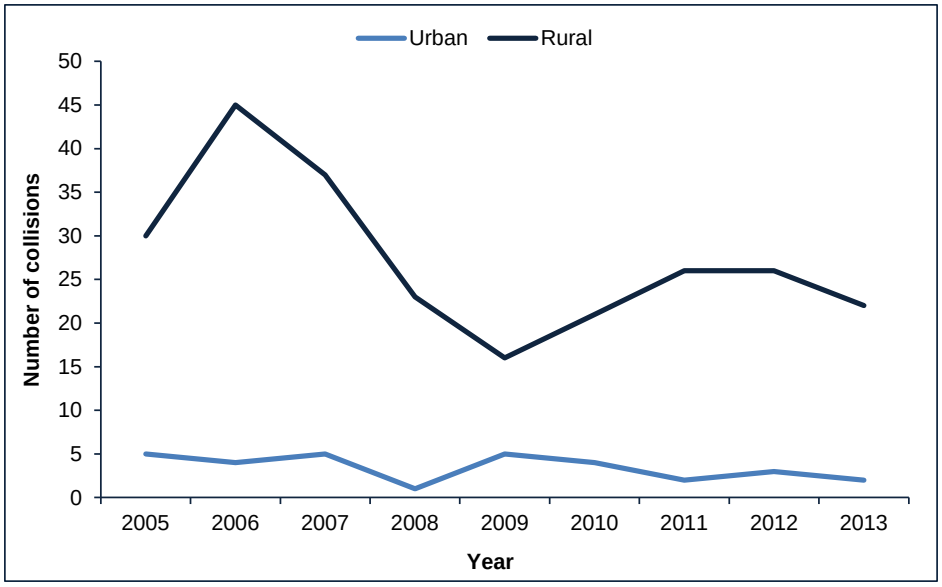

Figure 4: Trend of fatal RTCs in Cumbria according to urban-rural area classification of the collision location, 2005 – 2013 *(Source: STATS19)*

9. Health and Social Care Information Centre Indicator Overview

As noted in chapter 6.2, the HSCIC mortality data relates to an individual's local authority of residence and therefore these statistics do not include individuals that died as a result of an RTC in Cumbria who were non-residents. The data are also based on the date of death registration and not the date of death or the date in which the RTC occurred. The rates presented below for Cumbria are benchmarked against the rates for England.

9.1 Killed and Seriously Injured (KSI) in RTCs Trend

The number of Cumbria resident's KSI in a RTC has reduced by 59% over the last ten years from 482 in 2002 to 196 in 2012. As illustrated in **figure 5**, the crude rate per 100,000 population in Cumbria has reduced steadily and the 2012 rate of 39.3 KSI per 100,000 is similar to the England rate of 40.4 KSI per 100,000 population.

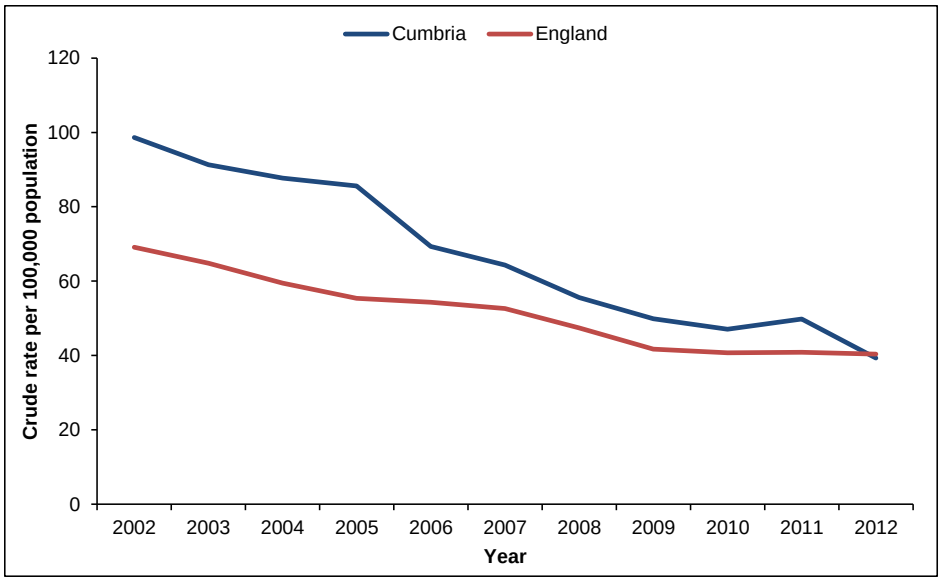

Figure 5: Crude rate per 100,000 population of people killed or seriously injured (KSI) in road traffic collisions, Cumbria and England, 2002 – 2012 (Source: Health and Social Care Information Centre)

9.2 Mortality from Road Traffic Collisions Trend

As shown in **figure 6**, the annual trend of mortality from RTCs among Cumbria residents is sporadic. Since 1996 the highest rate observed was in 2000 at 12.1 deaths per 100,000 population. The rate in Cumbria has been consistently higher compared to the North West, and with the exception of 2003 the Cumbria rate has also been consistently higher compared to England.

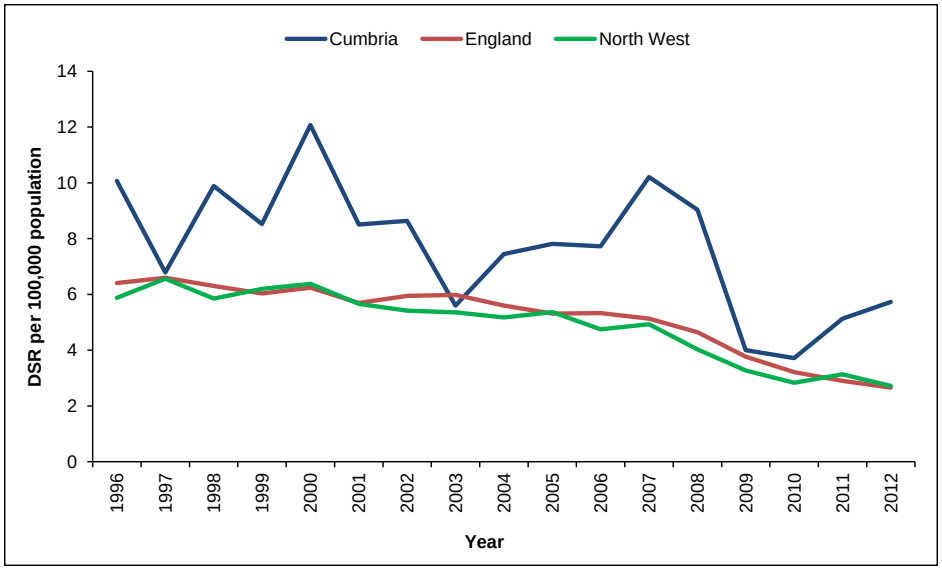

Figure 6: Trend of directly standardised rate (per 100,000 population) of mortality from road traffic collisions in Cumbria, England and North West, 1996 – 2012 (Source: Health and Social Care Information Centre)

Due to the smaller number of deaths recorded locally each year, it is likely that the fluctuations in the rates presented in **figure 6** are not statistically significant. **Figure 7** illustrates three year rolling average rates with 95% confidence intervals for Cumbria and England between 2008-10 and 2010-12 in order to determine any significant differences over the last five years. The 95% confidence intervals show that the rate change in Cumbria between 2008-10 and 2010-12 was not significant, however they do illustrate that the rate in Cumbria was significantly higher compared to England and the North West in 2008-10 and 2010-12.

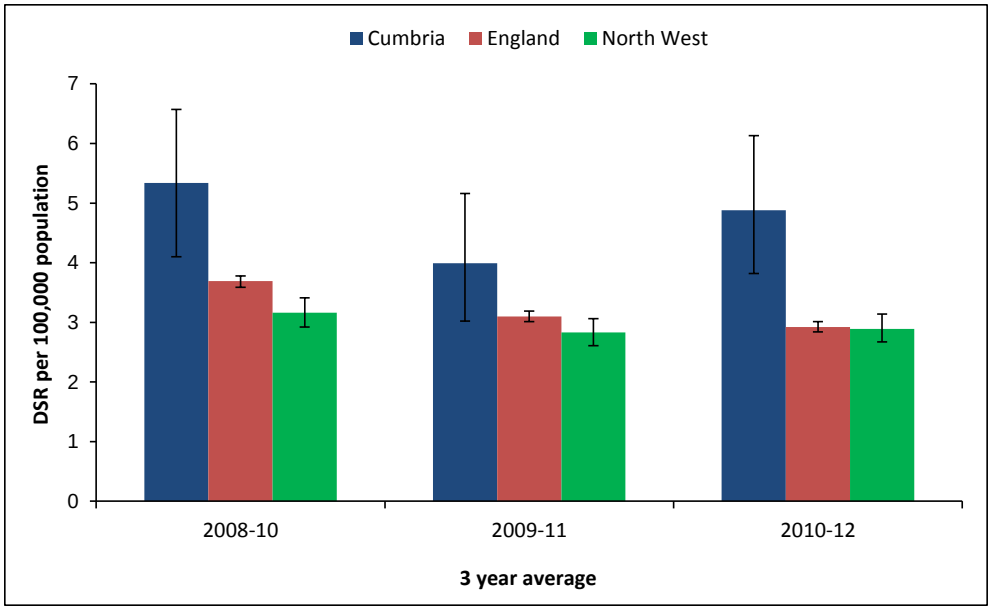

Figure 7: Trend of directly standardised rate (per 100,000 population) of mortality from road traffic collisions in Cumbria, England and North West, three year averages 2008-10 – 2010-12 (Source: Health and Social Care Information Centre)

9.3 Mortality from Road Traffic Collisions by Local Authority

In 2010-12 the highest mortality rate from RTCs in Cumbria was among residents of Copeland where the rate was 6.5 deaths per 100,000 population (**figure 8**). As illustrated by the 95% confidence intervals there were no significant differences between local authority areas across Cumbria. The rates in Copeland and South Lakeland were however significantly higher than the both England and North West rates, whilst the rate in Allerdale was significantly higher compared to England.

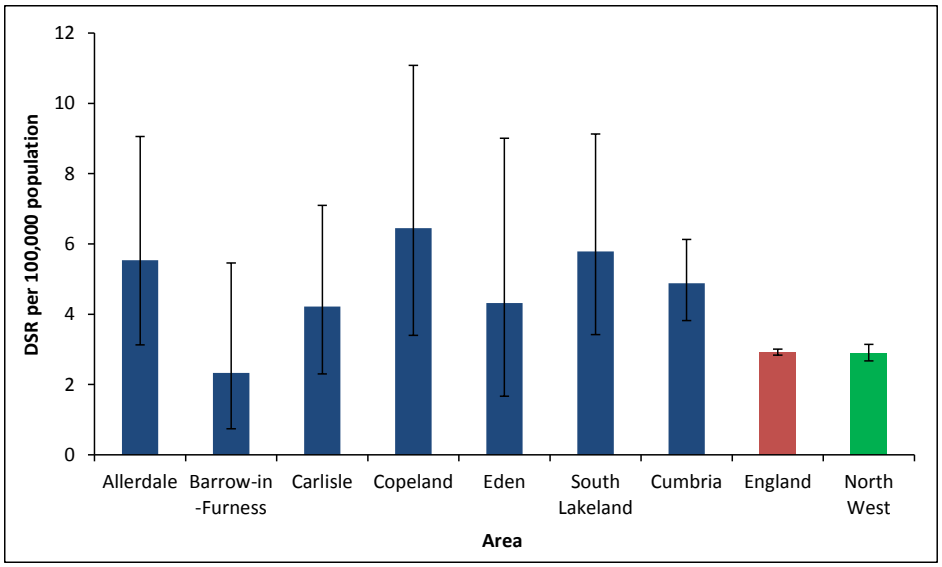

Figure 8: Directly standardised rate (per 100,000 population) of mortality from road traffic collisions by local authority area in Cumbria compared to England and North West, 2010-12
(Source: Health and Social Care Information Centre)

10. Review of 73 Fatal Road Traffic Collisions in Cumbria

10.1 Aims

Although quantitative data from STATS19 do provide valuable intelligence for the monitoring and prevention of fatal RTCs, other local data sources may complement the existing data and aid action on road safety. For instance, narrative text in particular can provide more detail on the events surrounding unintentional injury and death.

Collision investigation records contain a range of narrative text and information that is suitable to both qualitative and quantitative analysis, including details of the circumstances surrounding the event, the contributing factors, and witness statements. This review used a mixed method approach, using primarily police collision investigation records of fatal RTCs in Cumbria between 2012 and 2014, to explore if these might complement the routine data sources available to public health and help to identify further areas for prevention.

The specific aims of the review were to:

- Present a profile of fatal RTCs that occurred in Cumbria between 2012 and 2014.
- Identify the common avoidable factors and themes surrounding fatal RTCs in Cumbria.
- Contribute to and support local learning and decision making on reducing the risk of death from RTCs.

10.2 Methods

10.2.1 Data Source

Police collision investigation reports are the primary source of data used. The collision investigation reports are produced by the collision investigator who attends the scene of a fatal RTC. These reports provide a transcribed reconstruction of the collision based on the known facts as established at the scene and from the subsequent investigation. A typical fatal RTC investigation report outlines the evidence using the following structure:

- Brief circumstances.
- General road layout.
- Road and weather conditions.
- Procedures at the scene.
- Physical evidence.
- Description of the vehicle(s).

- Witness evidence.
- Reconstruction.
- Conclusions.

10.2.2 Case File Selection

All RTC fatalities in Cumbria where the incident occurred between 01 January 2012 and 31 December 2014 were eligible for inclusion. A fatality in this report conforms to the WHO definition, which requires death to occur within 30 days of the incident taking place. Within the collision investigation unit database there were 10 fatalities found to be the result of a medical episode at the wheel, 2 which occurred on a private road, and 1 probable suicide, these were therefore excluded from the analysis.

10.2.3 Data Collection

Guidance and permission to view and extract data from the collision investigation unit files was sought from Cumbria Constabulary. Following a police vetting procedure, permission was then granted to access collision investigation files, held electronically at Carlisle Police Divisional Headquarters. Eligible cases were obtained during visits to the Carlisle Police Divisional Headquarters, with data extraction and analysis taking place on site. Prior to the beginning of the study a data collection tool and framework was developed by the researcher and tested during a pilot data collection visit. The tool consisted of a number of areas based on common risk factors identified within the body of literature on this subject. Qualitative data from each collision record were extracted verbatim. Quantitative data such as demographics and basic details data about the RTC, including time of collision, road conditions, and collision outcomes were collected from a combination of collision records and STATS19 data where available. Where multiple fatalities were recorded from one collision, data on each fatality were extracted.

10.2.4 Data Analysis

Quantitative data collected from the collision investigation unit reports were collated into an excel spreadsheet and a case number was used to identify each fatality. The data was analysed descriptively and are mainly reported as numbers and percentages. Any narrative factors in the case files that were deemed to be significant by the researcher were collated, and this qualitative data was analysed using content analysis to extract the recurrent themes.

The content analysis began with close reading of individual reports, subsequent readings were used to code key points which were then grouped together as general themes. These were further refined as the recurrent and coherent themes were identified from the entire dataset.

11.2.5 Data Protection and Confidentiality

Due to the sensitive nature of the project, it was essential to ensure that the data collection process and the subsequent use of data complied with the Data Protection Act 1998 (DPA). The DPA principle states that personal data shall be processed fairly and lawfully,[14] and the purpose of this project specifically meet condition 6 of schedule 2 of the DPA:

- Condition 6 of schedule 2: the processing is necessary for the purposes of legitimate interests pursued by the data controller.[14]

The DPA is fundamentally concerned with personal data, and personal data has to be regarding a living person. This means that DPA does not apply to mortality or other records about deceased individuals, although such data could still be protected by confidentiality or other legal rules.[15]

It should also be noted that coroners' inquests are generally held in public and their findings are often reported by the media, therefore some of the information regarding fatal RTCs is already available in the public domain and is deemed of public interest.[16] Similarly, the media often report when an individual appears in court in relation to death by careless or dangerous driving.

10.3 Results

10.3.1 Individual Demographic Characteristics

In Cumbria, between 01 January 2012 and 31 December 2014 there were 73 fatal RTCs which resulted in 78 fatalities and 2,120 potential years of life lost (PYLL). The average age of those killed in an RTC was 48 years. More males died compared to females (79% and 21% respectively), and residents of Allerdale accounted for the highest proportion of fatalities at 27%. Car drivers made up the highest share of road deaths at 38%, followed by motorcyclists at 23%. **Table 2** outlines the demographic characteristics of the 78 RTC fatalities in Cumbria between 2012 and 2014.

Table 2: Demographic characteristics of 78 RTC fatalities in Cumbria, 2012 – 2014

Characteristic	*n*	%
Gender		
Male	62	79
Female	16	21
Persons	78	100
Age Group		
>17	3	6
17 - 24	17	35
25 - 44	3	6
45 - 64	3	6
65+	23	47
Area of Residency		
Allerdale	21	27
Barrow-in-Furness	11	14
Carlisle	6	8
Copeland	4	5
Eden	8	10
South Lakeland	13	17
Other (non-Cumbria resident)	15	19
Road User Category		
Car Driver	30	38
Motorcyclist	18	23
Pedestrian	13	17
HGV/MGV	4	5
Car Front Seat Passenger	6	8
Car Rear Seat Passenger	3	4
Pedal Cyclist	3	4
Quad Biker	1	1

The most common cause of death noted in death certificates was multiple injuries, with almost half (47%) of people killed in an RTC sustaining multiple injuries, and there were 28 people (36%) who sustained a fatal head, neck and/or chest injury (**table 3**).

Table 3: Number and percentage (%) of fatalities by cause of death as noted on death certificate
(Source: Local death registration data)

Cause of death	*n*	%
Multiple injuries	37	47%
Head, neck and/or chest injuries	28	36%
Drowning/immersion in water	3	4%
Abdominal injury	2	3%
Internal bleeding	1	1%
Spinal cord injury	1	1%
Unknown	6	8%
All fatalities	**54**	**100%**

In total, 55 (71%) of the fatalities that occurred between 2012 and 2014 had been through a Coroner's inquest procedure. 15 of the fatalities (19%) had been passed to the Crown Prosecution Service (CPS), and there were 8 (10%) cases in which the inquest had yet to take place. **Table 4** shows the number and percentage of fatalities according to inquest conclusion. In 27 cases (35%) the coroner delivered a verdict of road traffic collision, compared to 24 (31%) of cases where a verdict of accidental death was returned. It is important to note that the road traffic collision verdict was not introduced until 25 July 2013.[4]

Table 4: Number and percentage (%) of fatalities by inquest conclusion
(Source: Local death registration data)

Inquest conclusion	*n*	%
Road traffic collision	27	35
Accidental death	24	31
Misadventure	1	1
Narrative	1	1
Unknown	2	3
Inquest pending	8	10
No inquest - CPS	15	19
Total	**78**	**100**

The majority (69% or *n*.54) of individuals in a fatal RTC died at the scene of the collision, as outlined in **table 5**. For the remaining 24 individuals who were pronounced dead in hospital, it was not possible to determine whether they had died following any treatment/procedure or whilst being transported to hospital. Of those who died in hospital, the highest proportion of individuals were taken to the Cumberland Infirmary.

Table 5: Number and percentage (%) of 78 fatalities according to place of death

Place of death	*n*	%
Scene of Accident	**54**	**69**
Hospital		
Cumberland Infirmary	7	9
Royal Preston	4	5
West Cumberland Infirmary	4	5
Newcastle Royal Victoria	3	4
Royal Lancaster Infirmary	3	4
Furness General Hospital	2	3
James Cook Hospital, Middlesbrough	1	1
Total Hospital	**24**	**31**
All Fatalities	**78**	**100**

A residential postcode was available for 56 of the 63 Cumbria residents who died, each postcode was then assigned a lower super output area (LSOA) code which was then linked to an Indices of Multiple Deprivation (IMD) score and deprivation quintile. **Figure 9** shows the rate of mortality from RTCs of Cumbria residents between 2012 and 2014 according to national deprivation quintile. Quintile 1 refers to the most deprived national fifth of areas, whilst Quintile 5 refers to the least deprived national fifth of areas. Analysis revealed that in Cumbria there appears not to be a significant association between mortality from an RTC and deprivation. Although the rate of mortality in quintile 5 was 1.9 times higher compared to quintile 1 (6.4 and 3.3 deaths per 100,000 population respectively), the 95% confidence intervals do not show any statistical significance.

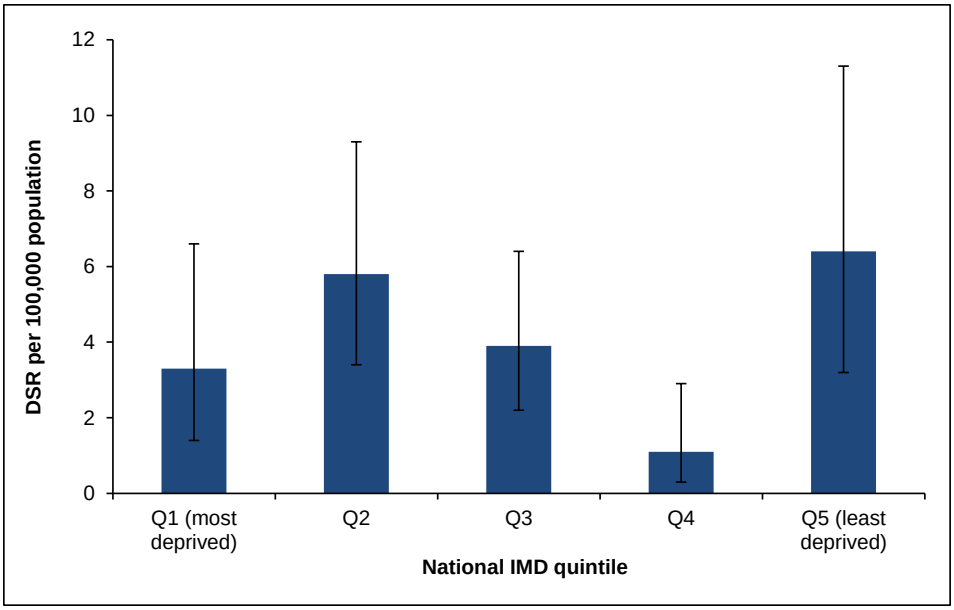

Figure 9: Directly standardised rate (per 100,000 population) of mortality of Cumbria residents from RTCs, 2012 - 2014

10.3.2 Fatal Road Traffic Collision Characteristics

Table 6 outlines the characteristics of the 73 fatal RTCs in Cumbria between 2012 and 2014. The highest proportion of fatal collisions occurred in South Lakeland (29%) followed by Allerdale (22%) and Eden (21%). The majority of fatal collisions occur on the county's A-roads (62%); and additional analysis revealed that the A595, the A6, and the A66 were particular stretches of road in which fatal collisions were most common between 2012 and 2014, with 11 fatalities on the A595, 8 fatalities on the A6, and 5 fatalities occurring on the A66.

Table 6: Characteristics of 73 fatal RTCs in Cumbria, 2012 – 2014

Characteristic	*n*	%
Location Local Authority		
Allerdale	16	22
Barrow-in-Furness	7	10
Carlisle	8	11
Copeland	6	8
Eden	15	21
South Lakeland	21	29
Total	73	100
Road Type		
Motorway	4	5
A-Road	45	62
B-Road	12	16
C-Road	3	4
Unclassified	9	12
Day of Week		
Mon	8	11
Tues	9	12
Wed	12	16
Thurs	12	16
Fri	7	10
Sat	9	12
Sun	16	22
Time Reported (24 hours)		
00:00 - 04:00	2	3
04:00 - 08:00	6	8
08:00 - 12:00	17	23
12:00 - 16:00	23	32
16:00 - 20:00	14	19
20:00 - 24:00	11	15

10.3.3 Common Themes

This chapter presents results and an in-depth description of fatal RTCs in Cumbria according to the following specific themes and road user groups:

- Speed related collisions.
- Alcohol and drug impairment.
- Fatigue.
- Motorcycle fatalities.
- Younger drivers.
- Older drivers.
- Pedestrian fatalities.

It is important to note that in many cases there is often an overlap between the specific groups and themes, for example a number of the motorcycle fatalities are also speed related, and a number of the speed related RTCs also involve alcohol and/or drug impairment.

10.3.3.1 Speed Related Collisions

There were 29 people killed in 26 RTCs in which excess or inappropriate speed was recorded as a contributory factor (37% of road deaths and 36% of collisions)

Summary Points:

- 38% (*n.*11) of fatalities from speed related RTCs were motorcyclists.
- 6 drivers were sentenced to prison following a fatal speed related RTC.
- 47% (*n.*9) of fatal RTCs involving drivers/riders under the age of 25 were speed related.
- 56% (*n.*9) of fatal RTCs involving a driver/rider aged 25-44 years were speed related.
- 37% (*n.*13) of fatal RTCs that occurred between the hours of 08:00 and 16:00 were speed related.
- 37% (*n.*11) of fatal RTCs that occurred between the hours of 16:00 and 24:00 were speed related.
- 62% (*n.*16) of fatal RTCs that were speed related involved a vehicle losing control on a bend.
- Alcohol and/or drug impairment was the most common co-existing contributory factor at 35% (*n.*9).
- In 27% (*n.*7) of speed related fatal RTCs, there were also other elements to the individuals' manner of driving in addition to speeding that could be described as 'risk taking behaviour' e.g. hazardous overtaking.
- In 11% (*n.*3) of speed related fatal RTCs, there were tyre related factors noted as potential contributory factors to the collision.

Whilst speed limits only declare higher speeds to be illegal, it remains for each driver and rider to decide on the appropriate speed within the limit.[17] In this report "excess speed" is defined as a vehicle exceeding the relevant speed limit; "inappropriate speed" refers to a vehicle travelling at a speed that is unsuitable for the prevailing road and traffic conditions. For the purpose of this report, the term 'speed related collision' or 'speeding driver/rider' will be used.

Speed as a factor in fatalities has been well-researched; for example *Bédard et al (2002)* found that travelling at a speed of 112 kph (70mph) or more was independently associated with a 164% increase in the odds of a fatality compared with speeds of less than 56 kph (35mph).[18] In the UK, *Quimby (2005)* found that drivers recognise that driving too fast is a major contributory factor in accidents compared to drivers in most EU countries but also that they do not necessarily associate driving 'faster' (than other drivers) with driving more 'dangerously' – where their own driving is concerned.[19]

Road user type and speed related fatalities

Between 2012 and 2014, there were 29 fatalities as a result of RTCs involving speeding drivers or riders. **Table 7** shows the breakdown of these 29 fatalities according to road user type, of which 38% (*n.*11) were motorcyclists. Drivers accounted for 28% (*n.*8) of speed related fatalities, passengers accounted for 17% (*n.*5), and pedestrians 10% (*n.*3). A cyclist and a quad biker were also fatally injured in a speed related RTC.

There were 6 drivers/riders involved in a speed related fatal RTC who survived the incident and were then prosecuted and sentenced to prison for either dangerous driving or driving without due care and attention. There was also 1 additional driver who at the time of writing was still awaiting prosecution.

Table 7: Number and percentage (%) of fatalities as a result of RTCs involving speeding drivers or riders, 2012-2014

Road user type	*n*	%
Motorcyclists	11	38
Drivers	8*	28
Passengers	5	17
Pedestrians	3	10
Cyclist	1	3
Quad biker	1	3
Total	**29**	**100**

*****3 drivers died as a result of another speeding driver/rider, 2 of whom also died.

Driver age and speed related collisions

The mean age of drivers/riders involved in speed related fatal RTCs was younger than the mean age of drivers in all other incidents in the sample (mean age 35 years, vs. mean age 53 years respectively).

Analysis by four defined age groups (>25, 26-44, 45-64, <65) showed that there was a general downward trend of speed related fatal RTCs according to driver/rider age (**figure 10**). Results revealed that 47% (*n.*9) of fatal collisions where drivers/riders were under the age of 25 years involved the individual driving at an excess or inappropriate speed. This factor then increased slightly to 56% (*n.*9) for drivers/riders aged 25-44 years. Among drivers/riders aged 45-64 years, 32% (*n.*7) of incidents involved the individual driving at an excess or inappropriate speed. There was only 1 driver/rider over the age of 65 involved in a fatal RTC who were driving at an excess or inappropriate speed (7%).

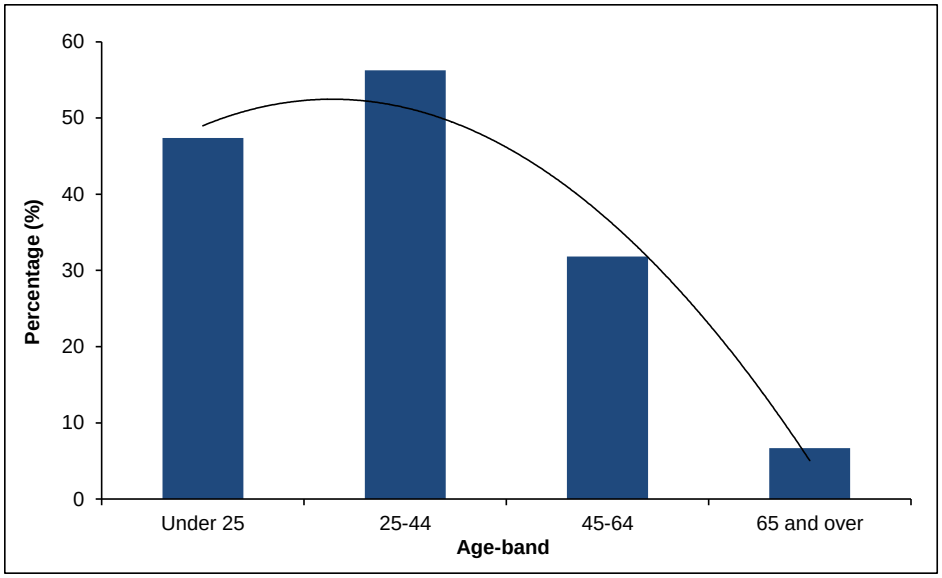

Figure 10: Percentage (%) of fatal RTCs involving a speeding driver/rider according to age band, 2012-2014

Time of day and speed related collisions

The time at which each collision was reported to the police was collated and grouped into eight hourly bands starting and ending at midnight. Analysis shows that 37% (*n.*13) of fatal RTCs occurring between the hours of 08:00 and 16:00 were speed-related, and also 37% (*n.*11) of fatal RTCs occurring between the hours of 16:00 and 24:00 were speed-related, as illustrated in **figure 11**.

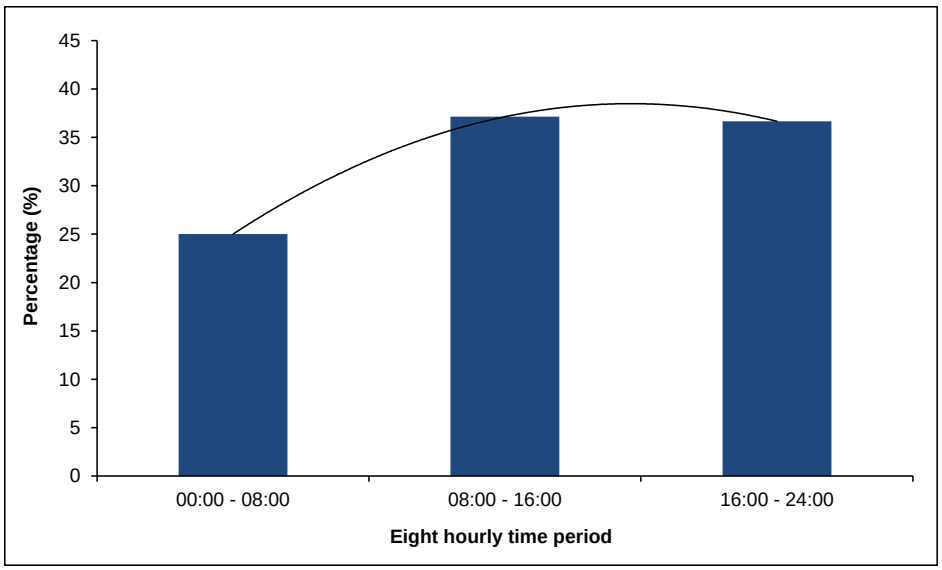

Figure 11: Percentage (%) of fatal RTCs involving a speeding driver/rider according to eight hourly time period, 2012-2014

Speed related collision type

After an individual had lost control of a vehicle at excess or inappropriate speed, the impact of the collision was commonly 'frontal' (73%, *n.*19), with the driver/rider either colliding with a wall, lamp-post, pedestrian, or another vehicle on the road. There were 6 (23%) cases where the vehicle had experienced a 'roll-over' (note that 2 of those cases also experienced 'frontal' impact before a 'roll-over'), and there was 1 instance where a motorcyclist came off their motorcycle and slid down the carriageway. Overall, 62% (*n.*16) of the speed related RTCs involved a vehicle losing control on a bend.

Speed and other contributory factors

Alcohol and/or drug impairment

Analysis showed that 35% (*n.*9) of speed related fatal RTCs involved a driver/rider who was impaired by alcohol and/or drugs.

Risk taking behaviour

There were 7 (27%) speed related fatal RTCs whereby there were other elements to the individual's manner of driving/riding in addition to speed that could best be described as 'risk taking behaviour'. This included hazardous overtaking manoeuvres (e.g. overtaking on the incorrect side of a traffic island and disobeying double white lines on an approach to a hill), incorrect motorcycle positioning on the approach to a corner (e.g. deliberately crossing into the opposing lane and no significant leaning taking place), rushing for a social event, driver inexperience and overconfidence in relation to driving ability, and failing to anticipate the implication of risks associated with travelling at speed on narrow roads where the views are limited due to the topography.

Tyre related factors

In 11% (*n.*3) of cases, tyre related factors were noted by the collision investigator as a potential contributory factor. For instance, in one case the vehicle's tyre pressure was discovered to be considerably lower than the manufacturer's recommended 33 psi. The collision investigator went on to say that this could have had a detrimental effect on the vehicle's handling, especially as the driver in question was estimated to be travelling at 60mph in a 30mph zone. Another vehicle's front tyres were found to have more tread in comparison to the rear tyres, in this instance the conditions were also very wet and a temporary lower speed limit was being advised to motorists; the collision investigator stated that the difference in tyre tread possibly

contributed to loss of control as the vehicle subsequently aquaplaned and lost traction. Finally, a motorcycle which lost control was believed to have a reduced level of grip as a result of the type of tyre that was fitted; the tyre fitted was designed for grip in muddy conditions.

Other contributory factors

Other contributory factors noted in speed related fatal RTCs included inappropriate braking, an error of judgment, unfamiliarity with the vehicle's handling, obscured vision/limited view due to topography, and fatigue.

10.3.3.2 Alcohol and Drug Impairment

There were 20 people killed in 18 RTCs that involved alcohol and/or drugs (26% of road deaths and 25% of collisions)

Summary Points:

- There were 9 (12%) deaths where a driver/rider involved in the fatal RTC was over the legal drink drive limit.
- The average blood alcohol level was 162 mg/ml.
- The highest recorded blood alcohol level was 253 mg/ml.
- 3 (4%) individuals were killed as a result of a drink driver/rider.
- There were 11 (14%) deaths from 9 RTCs whereby drugs were found to be in the system of a driver/rider involved.
- Cannabis was the most common drug, detected in 5 of the 9 drug related RTCs.
- 32% of fatal RTCs where drivers/riders were under the age of 25 involved the individual being impaired by either drink or drugs.
- There was a general downward trend of fatal RTCs involving drink/drug impairment according to age.
- Over two fifths (44%) of fatal RTCs involving a driver/rider who was impaired by alcohol and/or drugs occurred between the hours of 20:00 and 08:00.
- In 9 (50%) of the RTCs involving alcohol and/or drugs "inappropriate or excess speed" contributed to the incident.
- There were 4 drivers/riders impaired by alcohol and/or drugs that did not sustain fatal injuries but another person was killed, all were prosecuted and sentenced to prison. There was also 1 driver awaiting prosecution at the time of writing.

Alcohol impairment

The legal alcohol limit for drivers in the UK is 80 milligrammes of alcohol per 100 millilitres of blood, 35 microgrammes per 100 millilitres of breath, or 107 milligrammes per 100 millilitres of urine.[20]

Between 2012 and 2014, there were 9 (12%) deaths where a driver/rider was found to be over the legal drink drive limit. The average blood alcohol level (where this could be measured) was 162 mg/ml (i.e. twice the UK legal driving limit of 80 mg/dl). The highest blood alcohol level recorded was 253 mg/ml, i.e. over 3 times the legal drink drive limit. There was one case whereby the level of alcohol per 100 millilitres of blood was estimated to be between 168 – 333 mg/ml. Of the 9 deaths where a driver/rider was over the drink drive limit, 6 of those drivers/riders died in the collision, thus meaning that 3 individuals (4% of all fatalities) were killed as a result of a drink driver/rider.

In addition, there were 2 pedestrians who died, one of whom was 1.5 times over the legal drink drive limit at the time of death, and the other 3 times over the legal drink drive limit at the time of death. The drivers of the vehicles involved in these two RTCs were not found to be under the influence of alcohol or drugs; however one driver was sentenced for death by dangerous driving.

Drug impairment (licit and illicit)

There were 11 (14%) deaths from 9 RTCs whereby a trace of drugs was found in the system of a driver/rider involved in the collision. In 3 of those cases, the drug user did not sustain the fatal injuries. Drivers/riders found to have used drugs had an average age lower than that found in non-drug user driver/riders involved in a fatal RTC (mean age 32 years, vs. 48 years respectively). Cannabis was the most common drug, detected in 5 of the drug related RTCs, but also evident in 2 of those cases were prescription drugs and in another case mephedrone.

Included in the 11 deaths noted above, one was a cyclist whereby there was evidence of previous cannabis use; however there was insufficient blood available for a full analysis. Also, in one case the drug that was detected was the legal high 'China White'. In the two cases where prescription drugs were detected (namely mirtazapine, fluoxetine and diazepam), cannabis was detected in one case to be "at a level high enough to have affected time perception and complex tasks" and in the second case "the effects of cannabis may have been aggravated" by the prescription medication.

Driver age and alcohol and/or drug impairment

Analysis by four defined age groups (>25, 26-45, 45-64, <65) showed that there was a general downward trend of fatal RTCs involving drink/drug impairment according to driver age (**figure 12**). Analysis revealed that 32% of fatal RTCs where drivers/riders were under the age of 25

years involved the driver/rider being impaired by either drink and/or drugs. This factor fell in drivers aged over 45 years. Among drivers aged 25-44 years, 31% of RTCs involved the driver/river being impaired by drink and/or drugs, and 27% of fatal RTCs involving drivers/riders aged 46-65 years involved drink and/or drug impairment. There was only 1 driver over the age of 65 involved in a fatal RTC who was impaired by drink and/or drugs (6.7%).

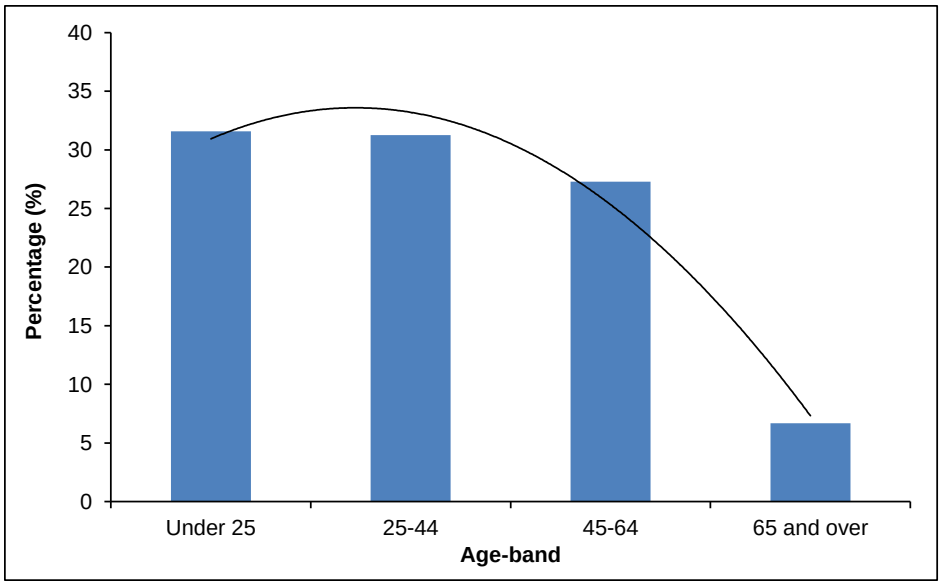

Figure 12: Percentage (%) of fatal RTCs involving a driver/rider who was impaired by alcohol and/or drugs according to age band, 2012-2014

Time of day and alcohol and/or drug impairment

The time at which each collision was reported to the police was collated and grouped into eight hourly bands starting and ending at midnight. Over two fifths (44%) of fatal RTCs involving a driver/rider who was impaired by alcohol and/or drugs occurred between the hours of 20:00 and 08:00. **Figure 13** illustrates the proportion of alcohol and/or drug related fatal RTCs according to each eight hourly time period and shows that 37% of all fatal RTCs that occurred between the hours of 16:00 and 24:00 involved a driver/rider who was impaired by alcohol and/or drugs.

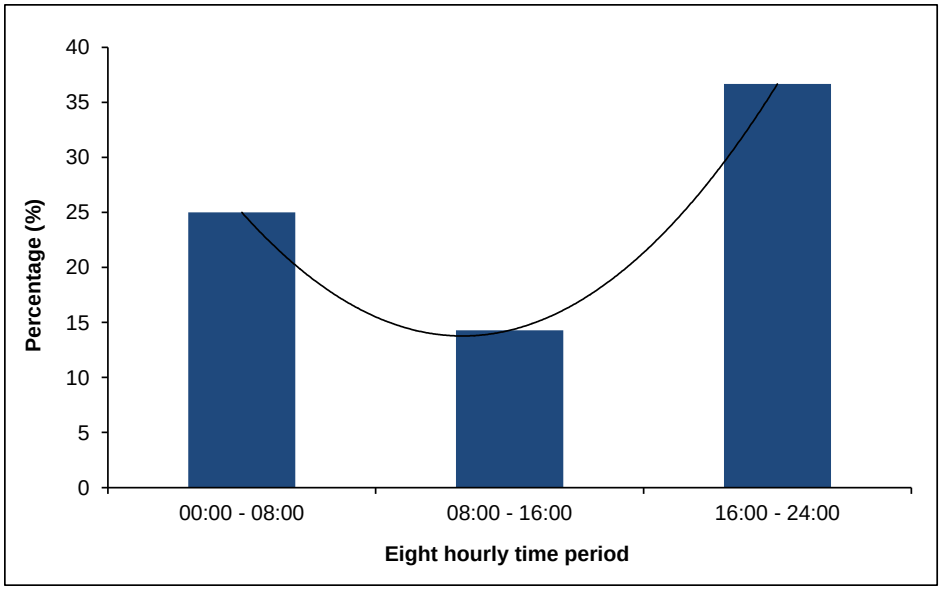

Figure 13: Percentage (%) of fatal RTCs involving a driver/rider who was impaired by alcohol and/or drugs according to eight hourly time period, 2012-2014

Contributory factors and alcohol and/or drug impairment

Analysis showed that the most common type of incidents in which an impaired drivers was likely to be involved in was a "loss of control" incident, especially when attempting to negotiate a bend or curve in the road (50%, *n*.9). Of all the RTCs involving an impaired driver, 50% (*n*.9) were single vehicle collisions.

In 9 of the 18 fatal RTCs (50%) which involved an impaired driver, the collision investigator concluded that "inappropriate or excess speed" was a contributory factor. Whilst in 3 cases, commentary referring to "poor concentration" or "distraction" was documented by the collision investigator.

There were 2 cases in which young drivers and passengers were engaged in "social driving" at night after consuming alcohol and/or drugs.

There were 2 pedal cyclists that died who were found to be impaired by alcohol and/or drugs, and in one case the coroner noted that the individual "was in no fit state to be riding a bike" In the other case, the collision investigator concluded that the cyclist had "failed to look correctly, thus leaving insufficient time or distance to stop and as a consequence ridden into the path of a vehicle".

Alcohol and/or drug impairment and prosecution

An individual 'causing death by careless driving when under the influence of drink may get up to 14 years' imprisonment, an unlimited fine, a ban from driving for at least 2 years, and an extended driving test before their driving license is returned'.[21] In terms of drug-driving, if an individual is found guilty of causing death by dangerous driving, the penalty is also a prison sentence of up to 14 years.[22]

Of the 5 drivers/riders who were impaired by alcohol and/or drugs and did not sustain any fatal injuries and where another person was killed as a result of the collision, 4 individuals were prosecuted and sentenced to prison. The sentences ranged from 5 to 8 years imprisonment, and each driver/rider was also banned from driving for between 3 and 8 years. It also transpired that one of the individuals who was sentenced had previously been convicted of dangerous driving and had their license revoked for a period of 12 months. Finally, at the time of writing, 1 individual was still awaiting prosecution.

10.3.3.3 Fatigue

There were 7 drivers/riders killed in an RTC where fatigue was recorded as a contributory factor (9% of road deaths and 10% of collisions)

Summary Points:

- The average age of drivers/riders killed in fatigue related RTCs was 43 years.
- 3 of the fatigue related RTCs occurred between the hours of 22:56 and 05:16.
- In 3 cases the driver had been working long hours, or had driven following a night of no sleep.
- Alcohol and/or drug impairment and misjudgement were noted as contributory factors in fatigue related fatal RTCs.

Research suggests that, internationally almost 20% of collisions on major roads are sleep related, that the peak times for sleep related collisions are in the early hours and after lunch. Men under the age of 30 also have the highest risk of falling asleep at the wheel. In Great Britain, fatigue was assigned as a contributory factor in 4% of fatal RTCs.[23]

Characteristics of fatigue related fatal RTCs

The average age of drivers/riders killed in fatigue related RTCs was 43 years (range 19 – 71 years); 6 were male, 2 were motorcyclists, and 3 occurred in the late evening or early hours of the morning (between 22.56 and 05:16).

Circumstances of fatigue related fatal RTCs

Commentary from within the collision investigation report, or during the inquest, noted that in 3 cases the driver/rider had been working long hours, or had driven following a night of no sleep. In one case the driver had opened the window in an attempt to counteract their sleepiness. Here, the collision investigator reported that *"research shows that there is no scientific evidence that methods to counteract sleepiness, such as cold air to the face (opening a window) or turning the car radio up work. They have shown that both methods provide only temporary benefit, being only partially effective for a short period (about 15 minutes). The best counter measure to sleepiness is to sleep or at least to take a nap".*

Contributory factors in fatigue related fatal RTCs

Alcohol and/or drug impairment

There were 4 cases in which the driver was found to be impaired through alcohol and/or drugs. There was 1 case in which the driver was 1.5 times the legal driving limit and a legal high substance found within the vehicle, it was speculated in the report that this substance was being used as a stimulant to combat fatigue. In 2 cases, cannabis was detected in the drivers system, and in one of those individuals mephedrone was also detected. Finally, 1 individual was found to have amphetamine and methylamphetamine in their system.

Misjudgement

In 2 cases, the collision investigator noted misjudgement as a consequence of fatigue as a contributory factor. For example, 1 rider had misread the topography of the road and 1 driver had misread the road layout and failed to input some steering to navigate a bend.

10.3.3.4 Motorcycle Fatalities

There were 18 motorcyclists killed, accounting for 23% of deaths on Cumbria's roads between 2012 and 2014. The mean age was 43 years.

Summary Points:

- 85% (*n.*15) of motorcyclists who died were residents of Cumbria.
- 56% (*n.*10) were aged between 45 -64 years.
- 72% (*n.*13) of fatal motorcycle RTCs occurred between the hours of 12:00 and 20:00.
- The road condition at the time of the collision was reported as being 'dry' in 78% (*n.*14) of cases.
- In 61% (*n.*11) of fatal motorcycle collisions, another vehicle was also involved. In 4 of those, the other driver identified to have caused the collision.
- In 33% (*n.*6) of incidents, the motorcyclist was riding in a group or with another motorcyclist.
- In 56% (*n.*10) of cases, speed was identified as a contributory factor in the collision. The highest estimated speed was 120 mph.
- Incorrect positioning and alcohol and/or drug impairment were also identified as contributory factors in some cases.

Cumbria is a popular riding place for motorcyclists who reside both within and outside of the county. The majority of motorcyclists killed were residents of Cumbria (85%, *n.*15), and there were 3 non-residents of Cumbria who died in a motorcycle collision.

Motorcyclist age

The mean age of motorcyclists who were fatally injured in a RTC was 43 years, ranging from 18 to 66 years of age. **Table 8** outlines the number and percentage of motorcycle fatalities according to age band.

Table 8: Number and percentage (%) of motorcycle fatalities by age band, 2012 - 2014

Age band	*n*	%
Under 25	3	17
25 - 44	4	22
45 - 64	10	56
65 and over	1	6
Total	18	100

Riding conditions and time of day

Information from the collision reports indicated that in all cases the conditions for riding were generally optimal and during daylight. For example, the time of the day of the collisions highlight that 72% (*n*.13) occurred between afternoon and early evening (12:00 – 20:00), whilst 17% (*n*.3) occurred in the evening (20:00 – 24:00) and 11% (*n*.2) occurred during the early morning (00:00 – 08:00). In almost all cases, the road condition at the time of the collision was reported as being 'dry' (78%, *n.*14).

Road layout and action taken

In 12 (67%) cases, the approach to the collision scene was one in which the motorcyclist was required to negotiate a bend in the road. In the remaining 6 (33%) cases, the approach was a straight section of road. **Table 9** provides some context to each fatal motorcycle collision in terms of the road layout, positioning of motorcycle, action taken, and the type of impact that occurred. Results show that 56% (*n*.10) of motorcyclists were known to have applied their brakes prior to the collision, all of whom had applied their brakes severely/heavily or inappropriately, and in half of the cases this braking resulting in loss of control. There were *n.*6 motorcyclists who had not taken any action prior as a result of having insufficient time in which to carry out a manoeuvre to avoid the collision. Table 9 also demonstrates the myriad of scenarios in which fatal motorcycle RTCs can occur.

Table 9: Brief circumstances surrounding each motorcycle fatality, 2012 – 2014

Class of MC	Approach to collision scene	Position of MC prior to collision	Action taken by motorcyclist	Impact
Enduro 124cc	Slight downhill right hand bend	Travelling on main road	Contact with kerb on nearside, resulting in loss of control	Struck wall and lamp post
Sports 1137 cc	Straight	Overtaking moving vehicle (commuter traffic) on its offside	Applied breaks (resulted in loss of control)	Into an oncoming LGV
Sports 600 cc	Left hand bend	Overtaking four motorcycles, crossed into opposing lane	No action	Into an oncoming car
Dual-Sport 1200 cc	Right hand bend	Travelling on main road. Confronted with car on incorrect side of road	No action	Into the oncoming car which was on incorrect side of road
Sports 1000 cc	Left hand bend	Crossed into opposing lane (into patch of gravel)	No action	Into boundary fencing
Sports 1200 cc	Left hand bend	Crossed into opposing lane	Applied brakes (possibly inappropriately)	Into an oncoming car
Sports 1099 cc	Uphill right hand bend	Travelling on main road	Very heavy and inappropriate breaking (loss of control)	Into a turning agricultural vehicle
Sports 999 cc	Slight downhill right hand bend	Travelling on main road (excessive speed)	Severe braking (locking wheel and loss of control)	Into a wall
Sports 1000 cc	Left hand bend	Crossed centre line	loss of control	Into an oncoming car
Naked 1000 cc	Straight	Travelling on main road	No action	Into livestock (bull) in the road
Naked 998 cc	Straight	Travelling on main road (excessive speed)	Heavy breaking applied	Into a turning car
Sports 995 cc	Straight, approaching dual carriageway	Followed white line towards opposite side of dual carriageway	Severe braking applied	Into a solid stone 'keep left' sign
Sports 599 cc	Sweeping right hand bend into straight	Travelling on main road	No action	Into a car turning right
Sports 998 cc	Straight	Traveling on main road, encountered vehicle making U-turn manoeuvre	Severe braking (locking wheel)	Into turning car
Sports 998 cc	Left hand bend	Crossed centre line	Heavy braking (locking wheel)	Into an oncoming car
Naked 998 cc	Left hand bend	Crossed centre line	Heavy braking (locking wheel)	Into an oncoming car
Sports 399 cc	Straight	Traveling on main road, encountered vehicle making U-turn manoeuvre	Heavy braking (locking wheel)	Into turning vehicle
Sports 124 cc	Right hand bend	Travelling on main road	loss of control	Motorcyclist slid along the carriageway

Other vehicle involvement

There were 11 cases (61%) in which another vehicle was involved in the collision. There were 4 cases in which the driver of another vehicle was considered to have caused the collision. For instance, an older driver of a car failed to input left steering whilst negotiating a bend and as a result had drifted into the opposing carriageway and into the path of the motorcycle. It was believed that the driver of the car had failed to input steering due to either a distraction (inside or outside of the vehicle), fatigue, or failing to see or ignoring an advance sign and, therefore, miss-reading the road. In another case, the driver of a car emerged from a junction after failing to identify an approaching motorcycle (with illuminated headlights); the motorcydist had insufficient time to carry out a manoeuvre to avoid the collision. In the other 2 cases a vehicle had performed a U-turn in the road and failed to see the oncoming motorcyclist.

Motorcyclists riding in groups

There were *n*.6 (33%) cases in which the fatally injured motorcyclist was either riding in a group or with another motorcyclist. In 3 cases the motorcyclist was riding with 1 other motorcyclist, and in the other 3 cases there were 5+ other motorcyclists.

Contributory factors

Speed-related collisions

Of the 18 motorcycle fatalities, there were 10 (56%) in which speed was identified by the collision investigator as a contributory factor in the collision. In one case the speed of the motorcycle was identified to be in excess of 120 mph.

Incorrect positioning

There were 5 (28%) cases where there was an error of judgment in relation to the positioning and/or the degree of lean required for the motorcyclist to successfully carry out the intended manoeuvre.

Alcohol and/or drug impairment

There were 2 (11%) recorded cases in which the motorcyclist had either a level of alcohol over the legal limit, or drugs in their blood. The motorcyclist intoxicated with alcohol was just over the legal limit for driving, with a result of 82mg/100ml. The other motorcyclist had cannabis detected in his blood 'at a level high enough to have affected time perception and complex

tasks'. This motorcyclist was also found to have therapeutic levels of mirtazapine and fluoxetine in his system.

Other factors

Other factors identified as contributing to the fatal motorcycle collisions include fatigue, gravel in the road, and obscured vision/limited view of the collision location.

10.3.3.5 Younger Drivers

There were 18 people killed in 17 RTCs that involved a younger driver/rider aged between 17 and 25 (23% of road deaths and 23% of collisions)

Summary Points:

- The average age of the 18 younger drivers/riders was 21 years.
- 11 (61%) of the 18 people killed were the young car drivers/riders themselves.
- 7 other individuals were fatally injured (4 pedestrians and 3 passengers).
- 8 (47%) of the collisions occurred in the early hours between 22:30 and 05:30, 5 of which were social/leisure related journeys.
- In 8 (47%) cases, the approach to the collision scene was one in which the driver was required to negotiate a bend in the road.
- 4 young drivers were prosecuted for death by dangerous driving and 1 was awaiting prosecution at the time of writing.
- Speed was the most common contributory factor in fatal RTCs involving a younger driver (*n.*8, 47%).
- Alcohol or drug impairment was noted as contributory factors in 4 cases (24%).
- Inexperience or misjudgement was noted as a contributory factor in 3 cases (18%).

Younger driver age

The average age of the 18 young drivers (between 17 and 25 years) who were involved in a fatal RTC was 21 years of age. Eleven (61%) of those younger drivers were themselves fatally injured in the collision, however there were 7 individuals who died as a result of a younger driver (4 pedestrians, and 3 car passengers).

Time of day and road layout

Eight (47%) of the collisions occurred in the late evening and early hours of the morning between the hours of 22:30 and 05:30; in 5 of those cases, the journey was for social/leisure reasons. In 8 (47%) cases, the approach to the collision scene was one in which the driver was required to negotiate a bend in the road. In the remaining 9 cases, 2 occurred as the driver

was overtaking another vehicle, and 7 whilst the driver was travelling on a straight part of the road.

Prosecution

There were 7 collisions in which a young driver survived but fatally injured another individual, 4 of those individuals were prosecuted and sentenced to prison for death by dangerous driving, and 1 was awaiting prosecution at the time of writing.

Contributory factors and younger drivers

Speed-related collisions

Of the 17 fatal RTCs that involved young drivers, there were 8 (47%) cases in which speed was identified by the collision investigator as one of the contributory factors in the collision.

Alcohol and/or drug impairment

In 4 (24%) cases, the driver was found to be impaired by either alcohol or drugs, and in one case sleep was also noted as a contributory factors

Inexperience and misjudgement

There were 3 (18%) cases where the collision investigator identified either inexperience and/or misjudgement as a contributory factor to the collision. For example, the driver in one case was described to have misjudged the situation they were presented with due to inexperience, and in another case the driver was described to not have the skill required to readjust to the situation they were presented with.

Other contributory factors

Sleep, distraction and an obstructed view were also noted as contributory factors in 5 other of the collisions.

10.3.3.6 Older Drivers

There were 18 people killed in 16 RTCs that involved a driver over the age of 65 years (23% of road deaths and 22% of collisions)

Summary Points:

- Of the 16 fatal RTCs that involved an older driver/rider, there were 14 (88%) cases where the older driver/rider was responsible for causing the collision.
- The average age of the 14 older drivers who were responsible for causing the collision was 72 years of age.
- There were 5 fatal RTCs involving older drivers where the collision occurred either leading up to or at a junction.
- Misjudgement, observational error and medical episodes were identified as the main contributory factors.

A step towards improved collision outcomes for older drivers is a detailed understanding of their crash circumstances. For the purpose of this report an older driver is defined as individuals aged 65 and over. Between 2012 and 2014 there were 18 people fatally injured in 16 RTCs which involved an older driver, representing 23% of road deaths and 22% of RTCs. Of those 16 RTCs, there were 14 (88%) cases where the older driver involved was responsible for causing the collision.

Older driver age

The average age of the 14 older drivers who were responsible for causing the collision was 72 years of age, ranging from 66 to 92 years of age. In the remaining 2 RTCs where an older driver was fatally injured, these incidents were found to be caused by a driver under the age of 25 years and a motorcyclist aged 49 years.

Junction collisions and older drivers

There were 5 (31%) fatal RTCs involving older drivers where the collision occurred either leading up to or at a junction. For example, in one case an 88 year older driver had either failed to see an oncoming LGV at a junction, or they had believed there was sufficient time in which to carry out their intended manoeuvre. An 82 year old also pulled out from a minor junction into the path of another vehicle, and a 92 year old made an error of judgement when assessing and making their decision to exit a junction. In the other 2 cases, both drivers had suffered a medical episode which consequently resulted in the driver failing to turn at a junction and subsequently colliding with a wall; a rear seat passenger died in one case and the driver died in the other case.

Contributory factors and older drivers

Misjudgement

In 4 cases (25%) misjudgement was noted by the collision investigator as a contributory factor in the collision. For example, in one instance, the older driver had made a misjudgement in relation to the input of steering required to negotiate a bend safely. In another case, as noted in the section above, the driver had likely made a misjudgement in terms of having sufficient time in which to make turn from a junction. Finally, in 2 cases, the driver had made an error of judgement in relation to assessing and making a decision to exiting a junction.

Medical episode

The onset of a medical episode was identified in 2 cases (29%) as being one of the contributory factors in the collision. In one case the driver had blacked out following an epileptic episode and the rear seat passenger was fatally injured; here the coroner stated "I think doctors ought to take an active stance in relation to anyone who may have a problem and should also be required to notify the Driver and Vehicle Licensing Agency (DVLA)".

Observational error

In 2 cases (29%), the collision investigator noted an observational error as a contributory factor in the collision. In one case the driver had failed to see a pedestrian behind the vehide and, combined with restricted mobility and pedal application error, the driver had then struck the pedestrian. In the other case, as noted in the section above, the driver had possibly failed to see an oncoming LGV.

Other contributory factors

Other contributory factors included distraction/inattention, alcohol, failing to react appropriately to a flood, and unintentional application of the accelerator.

10.3.3.7 Pedestrian Fatalities

There were 13 pedestrians that were fatally injured in RTCs (17% of road deaths and 18% of collisions)

Summary Points:

- The average age of pedestrians who were fatally injured was 52 years.
- In 6 cases (46%) the driver of the vehicle was found to be responsible for causing the collision.
- Most (*n.*10, 77%) occurred between the hours of 08:00 and 18:00 and all during daylight hours.
- Driver observation and pedestrian behaviour/misjudgement were noted as the main contributory factors in the incidents.

Pedestrian fatalities and age

The average age of pedestrians who were fatally injured was 52 years (range 14 – 92 years), whilst the average age of the drivers was 39 years (range 17 – 76 years).

Pedestrian fatalities and blameworthiness

In 6 cases (46%), the driver was found to be responsible for causing the collision, 3 of whom were prosecuted for death by dangerous or careless driving, and 1 was awaiting prosecution at the time of writing. In 2 cases (15%), the pedestrian was believed to be responsible for the collision, whilst in the 3 cases (23%) it was inconclusive as to whether the driver or pedestrian was at fault. In the remaining 2 cases (15%), it was found that the driver/rider would not have realistically been able to take action to avoid the pedestrian.

Pedestrian fatalities and time of day

The majority of RTCs in which a pedestrian was fatally injured occurred between the hours of 08:00 and 18:00 (*n.*10, 77%), or in other words during daylight hours. In 2 of the remaining 3 cases where the incident occurred later, light conditions at the scene were described as being 'still very good day light' and 'not fully dark', whilst in the 3rd case there was no description noted regarded light conditions at the scene.

Contributory factors and pedestrian fatalities

Driver observation

In 4 cases (31%) the collision investigator noted driver observation as a possible contributory factor in the collision. In one case the driver failed to see a pedestrian behind the vehicle, and in 3 cases the driver had failed to see the pedestrian in the road when ahead.

Pedestrian behaviour/misjudgement

There were 3 cases (23%) in which the behaviour of the pedestrian had been responsible for or contributed to the collision. For example, in one situation a pedestrian was in the road and both the driver and pedestrian had thought that the other would take evasive action; the coroner stated "it is perfectly plain that there had been something of a joke, and it went terribly wrong". In another case, a pedestrian with a history of binge drinking was 3.5 times over the legal driving limit when struck by a car, the driver of which had no time to react. Finally, a pedestrian misjudged a gap in the traffic whilst attempting to cross a busy road at a busy time of day, and ran into the path of an oncoming vehicle, the driver of which had no time to react.

Other contributory factors

Other contributory factors included an obstructed view, inappropriate and excess speed, and alcohol and/or drug intoxication.

10.3.4 Fatal RTC Hotspot Areas

Based only on the 73 RTCs included in this review, 2 potential hotspot areas were identified. The first relates to a particular stretch of road on the A595 near Blackbeck in the Egremont area, Copeland. The A595 is a single carriageway road with one lane in each direction; it contains numerous straight sections and gradient changes and the national speed limit of 60mph applies. **Figure 14** shows the locations of two motorcycle fatalities that occurred in this area, one in September 2012 and the other in November 2013.

The second potential hotspot area relates to a section of the A683 near Middleton, South Lakeland. The A683 follows a north to south route towards Lancaster via Kirkby Lonsdale and the well-known bikers meeting and rest point, Devil's Bridge. **Figure 15** shows the location in which a fatal motorcycle collision occurred in July 2012. The collision investigation report for this particular RTC also made reference to another fatal motorcycle collision that occurred in

2011 at exactly the same location, with the same alleged cause being gravel/soil in the centre of the southbound lane.

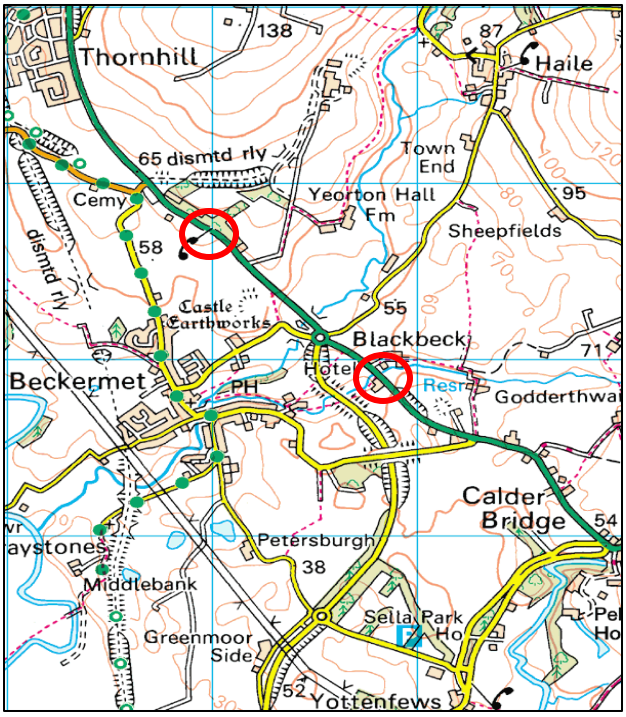

Figure 14: Location of two fatal motorcycle RTCs in Cumbria, A595 Blackbeck (© Crown Copyright. All rights reserved (Cumbria Constabulary)(01008C) 2012)

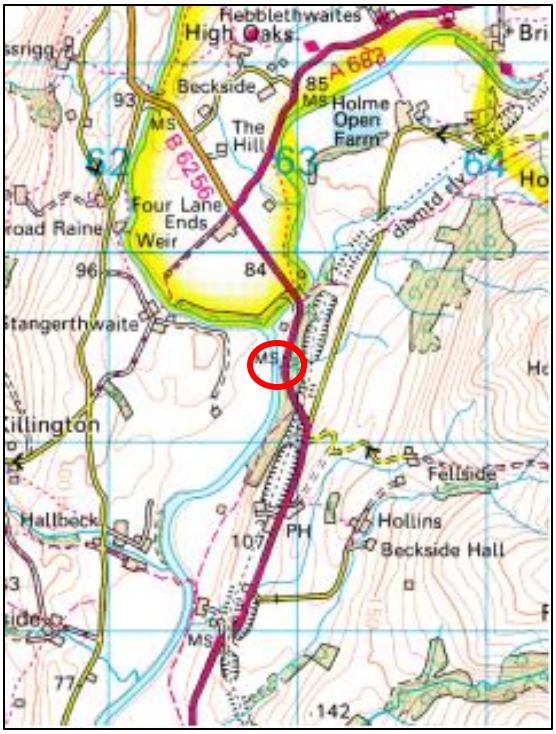

Figure 15: Location of two fatal motorcycle RTCs in Cumbria, A683 Middleton (© Crown Copyright. All rights reserved (Cumbria Constabulary)(01008C) 2012)

10.3.5 Prevention of Future Death Reports

Following an inquest, coroners have the legal power and duty to write a report if it appears there is risk of other deaths occurring in similar circumstances. This is known as a 'prevention of future death report' (previously known as a rule 43 report) which is then sent to organisations who are in a position to take action to reduce potential future risk. Subsequently, organisations must reply within 56 days stating what action they plan to take, however these responses and actions are not routinely published online.

Official bulletins published by the Ministry of Justice (MOJ), indicate that between October 2011 and February 2014 there were 7 reports issued by Cumbria coroners under the category of 'road (highway safety) related deaths'.[24] Brief details of the 7 reports are publically available and are summarised below; the first 5 are known to relate to cases included in the case file review of 73 fatal RTCs.

- Action should be considered to repair the parapet and erect a barrier to guide vehicles away from the hazard (B5307).
- Action should be considered to address the regular hazard of water spilling onto the B5307 near Wheyrigg Hall.
- There is no barrier or restriction at the end of the footpath such as commonly found on footpaths or school gates. The pavement is only some 1.5 metres wide. This means that children, whether on foot or otherwise, can emerge suddenly at speed straight into the line of traffic. It was also noted that a taller metal fence and shrubbery restricts the vision of both footpath and road users. These represent hazards which should be looked into (Brunel Way, Carlisle).
- To consider removing the boulder which supports a 'keep left' sign and re-painting white lines at the start of the dual carriageway of the A591 towards Thirlmere at Dunmail Raise.
- To consider a review of reporting medical conditions to the DVLA.
- To consider installing sensors or other safety devices at the rear of vehicles which have blind spots to prevent collisions.
- To consider if the weather station sensors on the A590 are sufficient to assess road conditions over the full length of the road.

10.3.6 STATS19 Data Errors

As previously noted in chapter 6, STATS19 data is the main source of data used nationally in relation to RTCs reported to the police, and local authorities use STATS19 as an aid to their decision making process as well as to assist with setting objectives. It is recognised within the literature that a significant proportion of non-fatal injuries are not reported to the police and, thus, are not included in the STATS19 data. In addition, the police officer attending the scene may underestimate the severity of an individual's injury due to the difficulty in distinguishing the severity at the scene of the collision. Conversely, injury severity may also be overestimated.

When the date of each RTC that occurred in 2012 and 2013 included within this review was cross referenced against the STATS19 data, a number of discrepancies were identified:

- A fatal RTC that resulted in the driver being prosecuted for death by careless driving was missing from the STATS19 database.
- A fatal RTC in which a pedestrian died at the scene of the collision was found to be recorded as a 'slight' RTC in the STATS19 database.
- There was 1 RTC in STATS19 recorded as 'fatal' that does not appear in the collision investigation unit fatal RTC database, nor is there a serious RTC recorded under that particular date.

At the time of writing, the STATS19 data for 2014 had not yet been released.

10.3.7 Medical Conditions and Disabilities

Medical licensing plays an important role in promoting road safety by establishing whether drivers with medical conditions are able to satisfy the medical standards required. The DVLA is largely responsible for deciding if a person is medically unfit to drive. It is essential that the DVLA know when a driving license holder has a condition, which may now, or in the future, affect their safety as a driver. Data from the DVLA showed that in 2013 they received 11,313 medical notifications relating to Cumbria residents, 4.4% (*n.*500) of which were then refused and revoked on medical grounds. **Table 10** shows the ten most prevalent medical conditions for which a licence was refused and revoked in Cumbria in 2013, with dementia being the most common reason (15.2%).

Table 10: Proportion (%) of licenses refused and revoked on medical grounds in Cumbria, by 10 most prevalent medical conditions, 2013 *(Source: DVLA FOI request)*

Medical Condition	%
Dementia	15.2%
Drug Misuse	7.6%
Epilepsy	7.3%
Alcohol Misuse	5.6%
High Risk Offenders (HRO)	5.1%
Diabetes - Insulin	4.6%
Bipolar Affective Disorder	4.6%
Parkinson's Disease	4.4%
Seizure - Solitary	3.2%
Glaucoma	3.2%

The review of 73 fatal RTCs between 2012 and 2014 found that there were cases in which the collision investigator was required to consider whether the driver/rider was in fact medically fit to drive. For example, while 2 drivers/riders who had been diagnosed with epilepsy, in one case the driver had declared the diagnosis to the DVLA and was cleared as fit to drive, and their condition was not found to be a contributory factor in the RTC. In the second case, however, the driver/rider had a diagnosis of nocturnal epilepsy and had medication to control the condition. The driver/rider suffered a medical episode at the wheel and a passenger was fatally injured. It transpired that the driver/rider had not informed the DVLA of any medical condition or medication that may have inhibited their ability to safely control a motor vehicle. Following the inquest, the coroner wrote to the DVLA and DfT regarding the apparent lack of importance put on notifying the DVLA about medical conditions (chapter 10.3.5).

In another case where a pedestrian was killed, the driver/rider had a diagnosis of multiple sclerosis and was assessed by a mobility clinician and driver adviser 18 months prior to the incident. Their driving ability was found to be satisfactory, and there was no evidence to suggest that driving ability had deteriorated over that 18 month period since the assessment. Nevertheless, the driver/rider did state during the police investigation that they do not turn to look through the vehicle windows when performing a manoeuvre due to having poor mobility.

There was also a case in which a driver/rider impaired by drugs had been responsible for the RTC in which another driver/rider was fatally injured. Two years prior to the RTC, the impaired driver/rider had their entitlement to drive revoked for a period of 12 months after failing a drugs screening test. The driver/rider applied to renew their license 12 months later, and a

medical questionnaire was completed by their GP where it was stated that the patient had no drug dependency recorded for five years. This information did not correspond with the individual's previous license revocation. Subsequently, the driver/rider was issued with a 'til 70' license.

It is the duty of the licence holder or licence applicant to notify DVLA of any medical condition, which may affect safe driving. GPs and other medical professionals have an important role to play in terms of advising their patients whether or not they should inform DVLA of their medical condition, and what the outcome of medical enquiries is likely to be. If a GP or other medical professional is aware that an individual has refused to stop driving against their advice, the GP or medical professional is required to contact the DVLA immediately and disclose any relevant medical information, in confidence, to the medical adviser. The patient should be informed in writing of the decision to disclose personal information to the DVLA.[25]

Given that new drug drive legislation came into effect on the 2nd March 2015, it is important that drivers, who are taking certain types of medication that is not prescribed to them, check whether the legislation will affect them.

10.4 Discussion

The results of this review highlight that although there are common themes in relation to the contributory factors and road user groups involved in fatal RTCs in Cumbria, the circumstances surrounding each fatal RTC are unique and there is often no single contributory or causal factor – the antecedents are many and complex.

Contributory factors

The use of inappropriate or excessive speed was a clear factor in over a third of the fatal RTCs (36%), and these were typically characterised as 'loss of control on bend' collisions and associated with alcohol and/or drug impairment. Motorcyclists and younger drivers were more likely to be involved in a speed related fatal RTC compared to other road user groups, and often there were other elements related to the individuals' manner of driving (in addition to the speeding) that could be described as 'risk taking behaviour'. In relation to younger drivers and speed, research studies have identified that driving is often viewed as an expressive activity and that risk-taking is an exciting challenge to their abilities.[26] With regards to motorcyclists and speed, some literature suggests that some motorcyclists like to 'push

their limits' and engage in 'extreme riding', but also consider this to be a normal part of riding behaviour.[27] Cumbria is an area that many motorcyclists are attracted to, thanks to an array of scenic locations and undulating county roads. However, it is important that all road users in Cumbria consider that there are a number of roads which pass through rural areas that, although covered by the national speed limit, are also characterised by topographical features which require drivers to avoid travelling at maximum speed. Rule 125 of the Highway Code states: *"the speed limit is the absolute maximum and does not mean it is safe to drive at that speed irrespective of conditions. Driving at speeds too fast for the road and traffic conditions is dangerous. You should always reduce your speed when the road layout or condition presents hazards, such as bends".*[28]

Driving/riding under the influence of alcohol and/or drugs was a contributory factor responsible for a quarter of fatal RTCs. Fatal RTCs involving drink/drug impaired drivers appeared to follow fairly predictable patterns, with the most collisions occurring in the late evening and early morning and were 'loss of control' incidents often associated with inappropriate or excess speed. The average level of blood alcohol found in impaired drivers causing a fatality was twice the current legal limit. This could suggest that the impaired drivers in this sample had not underestimated their level of intoxication and ability to drive having mistakenly assumed that they were under the limit. Rather, it appears likely that those individuals had taken a deliberate decision to drive whilst they knew themselves to be intoxicated. This type of deliberate risk taking behaviour resulted in 20 deaths between 2012 and 2015, and 4 confirmed prison sentences.

Cannabis was found to be the most common type of drug detected in drug drivers/riders; however it is important to note that the number was small and that other drugs were often detected in the individuals system. A previous UK study on self-reported driving behaviour and attitudes towards driving under the influence of cannabis found that over half of individuals who were interviewed said they would be deterred if there were effective roadside drug testing.[29] On the 2nd March 2015 new regulations came in to force regarding drug driving (chapter 4.3), along with new equipment that enables police officers to test drivers for cannabis and cocaine at the roadside.

Road user groups

The sample of cases examined show that there were three main road user types in Cumbria who were involved in fatal RTCs, each accounting for 23% of road deaths between 2012 and 2014: motorcyclists, younger drivers (aged 17-25), and older drivers (aged 65+).

As previously noted, the behaviours engaged in by motorcyclists were consistent with risk taking and travelling at high speeds. The general motorcyclist demographics indicate that the motorcyclists were all males, average age of 43 years, riding in the afternoon and early evening in fine, dry conditions. In most cases the motorcyclist was identified to be at fault and demonstrating risky driving behaviour (excess or inappropriate speed, incorrect positioning in the road, and alcohol/drug impairment). It would appear that significant changes in rider behaviour are therefore required to reduce a majority of motorcyclist fatalities in Cumbria. Currently, Cumbria Constabulary and the CRSP promote the BikeSafe initiative, a nationwide project that is run by local Police forces. The aim of BikeSafe is to promote safer riding through lectures and gives motorcyclists the opportunity to have their skill level assessed by experienced police motorcyclists.[30] A recent evaluation of BikeSafe in Cumbria showed that in 2014, 63 motorcyclists attended and completed the programme. The evaluation revealed that that 41 (65%) attendees were aged 41-60 years, and this corresponds to the age band in which the highest number of fatalities occurred (**table 8**). Although some key facts and figures in relation to age, gender, motorcycle category, engine size, how participants heard about BikeSafe, and evaluation scores of the programme were gathered, it is not known whether any actions or recommendations have been made as a result. In addition to BikeSafe, the enhanced rider scheme is now also available to motorcyclists in Cumbria. The enhanced rider scheme is a national programme which checks motorcycle riding skills and provides training. Once successfully completed, the Driver and Vehicle Standards Agency (DVSA) certificate of competence is awarded and discounts can be obtained on motorcycle insurance.[31]

The second road user group concerns younger drivers aged between 17 and 25 years, where almost half of the RTCs occurred in the late evening and early hours of the morning. Inappropriate or excess speed, alcohol/drug impairment, and inexperience and misjudgement were identified as contributory factors in the RTCs involving younger drivers, and this is a finding consistent with existing literature and knowledge. It is recognised that whilst younger drivers are able to master the practical skills of driving quickly, hazard perception skills require more experience. This means that younger drivers may often think that they are in control

of a vehicle when they are actually driving unsafely, and become more likely to take risks.[32] Furthermore, young drivers are less likely than older drivers to rate speeding as a high-risk behaviour.[33]

The third road user group concerns older drivers aged 65+. Older drivers have become a larger part of the UK driving population in recent years*),*[34] and given Cumbria's ageing population structure, it may be expected that RTCs and fatalities among older drivers in Cumbria are a particular cause for concern. From a public health perspective, a serious problem facing older people in relation to transport are issues relating to mobility and driving ability. As people get older, the physical effects of age take place, with deterioration in general health and fitness, eyesight, hearing, reaction time and physical mobility. The older drivers who were involved in the sample of fatal RTCs examined in this review appeared to show the same characteristics as older drivers in previous studies. Studies show that older drivers tend to make more observational or misjudgement errors, in particular in RTCs arising from right of way violations, as opposed to speeding or driving under the influence of alcohol and/or drugs.[26] The results of this review show that the average age of older drivers involved in fatal RTCs was 72 years, and that almost a third of the RTCs occurred either leading up to or at a junction. Misjudgement and observational error were also often contributory factors.

It is important to view road safety in the wider context; on the whole people in Cumbria are extremely dependent upon private transport, particularly in rural areas. In the areas where older people are dependent on private transport, being unable or reluctant to drive can essentially lead to isolation. The absence of or infrequent public transport in rural areas may be a possible explanation for people aged 65 and over in Cumbria having a higher car ownership compared with to national average, at 75% and 71% respectively.[35] Public health research does suggest that it is important to keep competent older drivers on the road. For example, researchers who conducted a study of 690 current and former drivers found that at the point older drivers stop driving; there is a sharp and immediate decline in physical functioning, social activities and general health.[36] This poses challenges in terms of determining when an individual may not be fit to drive, and at what point it is necessary for a person to stop driving. The CRSP recognise older drivers as a vulnerable road user group and offer the 'Drive Safely for Longer' scheme, which is free to residents of Cumbria aged 65+ to refresh driving skills and knowledge. Individuals who participate in the scheme are assessed by an instructor in a number of key skill areas, including observation, manoeuvring, hazard

awareness, and planning ahead. Individuals are then also provided with a hand-out of 'safety tips' for future reference.[37] The CRSP also outline on their 'mature motorists' webpage a list of medical conditions which must be reported to the DVLA and outline some guidance for individuals who may have concerns about the driving abilities of friends and relatives. However it should be reinforced that this should to apply to all road users of any age and not just those aged over 65. There is no clear cut off point when it comes to age and driving ability and individual circumstances need to be considered. When it comes to competency behind the wheel, 'functional age' rather than 'chronological age' may be a more appropriate way in which to determine driving ability.

GPs and other health professionals have an important role to play in terms of advising patients of any age whether or not they need to inform the DVLA of a medical condition, and also have a duty to notify the DVLA if they are aware of an individual who refuses to stop driving against their advice.[25]

10.5 Conclusions

This review used police collision investigation reports to examine 73 fatal RTCs in Cumbria between 2012 and 2014 in order to identify any common factors and themes.

The review found that speed and alcohol/drug impairment were factors in almost two thirds (61%) of the fatal RTCs examined, representing a loss of life that is completely preventable. Speed and alcohol/drug impairment are both factors which have been subject to both legal sanctions and extensive campaigns in the past. It would appear that, in the case of speed related fatal RTCs, there are two groups of drivers (namely motorcyclists and younger drivers aged between 17 and 25) who cannot be told often enough about the dangers to which they can expose themselves and their passengers when engaging in risk taking behaviour on our counties roads.

There appear to be three main road user groups involved in fatal RTCs in Cumbria: motorcyclists, younger drivers (aged 17-25), and older drivers (aged 65+). As expected, there are different issues facing the younger drivers and motorcyclists compared to older drivers. In accordance with existing literature, the younger drivers and motorcyclists involved in fatal RTCs were found to engage in 'risky' driving behaviour (namely speed and impairment), whilst older drivers are involved in RTCs where observational or misjudgement errors are contributory factors.

The review has highlighted that intelligence contained within collision investigation reports have a role to play in informing prevention efforts and can complement routinely collected STATS19 data. The discrepancies identified within the STATS19 data do highlight and reinforce the existing knowledge regarding the caveats of that particular dataset and the way in which it is collated, especially given that local authorities use this data to aid decision making. Collating the information that is collected as part of RTC investigations on a regular basis will help to build up a profile of not only fatal RTCs in Cumbria, but also those which result in serious injuries, thereby helping to target prevention efforts alongside the STATS19 data.

It is proposed that the findings and recommendations of this review be shared with and distributed to relevant organisations and stakeholders. For example, the Cumbria Health and Wellbeing Board, Cumbria Public Health Alliance and the six Health and Wellbeing Forums, the Cumbria Road Safety Partnership, and Cumbria Constabulary. The findings could also be used to inform Cumbria's Joint Strategic Needs Assessment.

10.6 Recommendations

- Given that speed and alcohol and/or drug use are the two major contributory factors in fatal RTCs in Cumbria, any existing prevention efforts in this area should be continued with an increased stress on road user groups about the risk of fatality caused by speeding and/or driving/riding whilst impaired through alcohol and drugs.

- Given that a high proportion of fatalities linked to speed and alcohol and/or drug use occur at night and among younger drivers, consider collaboration with pubs/bars to develop and deliver educational interventions in relation to speed and impairment. In addition, locality public health leads (once in post) could explore ways in which to distribute the findings from the review to local colleges and sixth form schools.

- Motorcyclists should continue to be a target group for road safety advice. Interventions in place should inform motorcyclists of the risks of speeding, both from an educational and road-based enforcement perspective. The results and information within this report could be used as examples to deter motorcyclists from travelling at inappropriate and/or excess speed.

- If not already in place, investigate the effectiveness of signage and/or speed enforcement interventions in motorcycle fatality hotspot areas.

- Continue local evaluation of the BikeSafe initiative to ensure that 'vulnerable' groups of motorcyclists are aware of and attending the scheme. Whether participants find the programme useful it and encourages them to ride more safely should also be assessed. If not already covered, the programme may benefit from focusing on 'attitudes' to riding and riding 'behaviour'.

- Observation and misjudgement were the most common reasons for fatalities amongst older people. Consider working with third sector providers of services for older people as an avenue for promoting education and information messages amongst this age group.

- Ensure that the local 'Drive Safely for Longer' scheme is promoted and evaluated, and that the assessment and hand-out cover the issues highlighted in this report as risks for the older population.

- Ensure that GPs and health professionals are aware of their role within road safety, particularly in relation to the medication and medical conditions they need to inform the DVLA of, and that they promote this amongst their patients (of all ages). A summary report could be produced for the Clinical Commissioning Groups (CCG) across Cumbria for discussion.

- Explore the potential to collate information from collision investigation reports on a regular basis to inform and target prevention efforts. In addition to fatal RTCs, this could also include information relating to serious RTCs.

11. References

1. World Health Organisation (WHO). *Road Safety: a public health issue*. WHO, 2004. http://www.who.int/features/2004/road_safety/en/

2. World Health Organisation (WHO). *Global Status Report on Road Safety 2013.* WHO, 2013. http://www.who.int/violence_injury_prevention/road_safety_status/2013/en/

3. Department for Transport (DfT). *Strategic Framework for Road Safety*. DfT, 2011. https://www.gov.uk/government/publications/strategic-framework-for-road-safety

4. Road Peace. *Verdicts.* Road Peace, 2014. http://www.roadpeace.org/change/effective_inquests/background/verdicts/

5. Department for Transport (DfT). *Accident and casualty costs (RAS60)*. DfT, 2014. https://www.gov.uk/government/statistical-data-sets/ras60-average-value-of-preventing-road-accidents

6. Department of Health (DH). *Living Well for Longer: A Call to Action to Reduce Avoidable Premature Mortality*. DH, 2013. http://www.gov.uk/govenment/pubilcations/living-well-for-longer-a-call-to-action-to-reduce-avoidable-premature-mortality

7. Brown R, Beynon C. *Avoidable Mortality in Cumbria: An Overview*. Centre for Public Health, 2013. http://www.cph.org.uk/wp-content/uploads/2013/08/Avoidable-Mortality-in-Cumbria-R-Brown_and_C-Beynon-Aug2013.pdf

8. Department for Transport (DfT). *Making Roads Safer*. DfT, 2012. https://www.gov.uk/government/policies/making-roads-safer#actions

9. Department for Transport (DfT). *Drug driving offence and drug screening devices: background information*. DfT, 2014. https://www.gov.uk/government/publications/drug-driving-offence-and-drug-screening-devices-faq

10. Cumbria County Council (CCC). *Annual Road Safety Plan 2014/15*. CCC, 2014. http://www.crsp.co.uk/images/RoadSafety_PLAN.pdf

11. Department for Transport (DfT). *Reported road casualties Great Britain 2013: summary*. DfT, 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358035/rrcgb2013-00.pdf

12. Department for Transport (DfT). *Transport Statistics Great Britain 2014*. DfT, 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/389592/tsgb-2014.pdf

13. Zwerling C, Peek-Asa C, Whitten PS, Choi S-W, Sprince NL, Jones MP. Fatal motor vehicle crashes in rural and urban areas: decomposing rates into contributing factors. *Injury Prevention* 2005; **11**: 24-28.

14. Information Commissioners Office (ICO). *Data Protection Principles*. ICO, 1998. http://www.ico.org.uk/for_organisations/data_protection/the_guide/the_principles

15. Information Commissioners Office (ICO). *Anonymisation: managing data protection risk code of practice*. ICO, 2012. http://ico.org.uk/for_organisations/data_protection/topic_guides/anonymisation

16. Medical Protection Society. *Inquests.* Medical Protection Society, 2014. http://www.medicalprotection.org/uk/england-factsheets/inquests

17. World Health Organisation (WHO). *The world report on road traffic injury prevention*. WHO, 2004. http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/

18. Bédard M, Guyatt GH, Stones MJ, Hirdes JP. The independent contribution of driver, crash, and vehicle characteristics to driver fatalities. *Accident Analysis and Prevention* 2002; **34** (6): 717–727.

19. Quimby AR. Comparing UK and European drivers on speed and speeding issues: some results from SARTRE 3 survey. *Behavioural Research in Road Safety 2005 Fifteenth Seminar*. DfT, 2005. London.

20. Government of the United Kingdom (GOV.UK). *The drink drive limit*. GOV.UK, 2015. https://www.gov.uk/drink-drive-limit

21. Government of the United Kingdom (GOV.UK). *Drink-drive penalties*. GOV.UK, 2014. http://www.gov.uk/drink-driving-penalties

22. Government of the United Kingdom (GOV.UK). *Drugs and driving: the law*. GOV.UK, 2014. http://www.gov.uk/drug-driving-law

23. International Transport Forum (ITF). *Road Safety Annual Report 2014*. IFT, 2014. http://www.internationaltransportforum.org/pub/pdf/14IrtadReport.pdf

24. Ministry of Justice (MOJ) *Reports to Prevent Future Deaths*. MOJ, 2014. http://www.judiciary.gov.uk/related-offices-and-bodies/office-chief-coroner/pfd-reports/

25. Driver & Vehicle Licensing Agency (DVLA). *For medical practitioners: At a glance guide to the current medical standards of fitness to drive*. DVLA, 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/390134/aagv1.pdf

26. Clarke DD, Ward P, Bartle C, and Truman W. Killer crashes: Fatal road traffic accidents in the UK. *Accident Analysis and Prevention* 2010; **42**: 764-770.

27. Watson B, Tunnicliff D, White K, Schonfeld C, Wishart D. *Psychological and social factors influencing motorcycle rider intentions and behaviour*. Australian Transport Safety Bureau, 2007. http://eprints.qut.edu.au/9103/1/road_rgr_200704.pdf

28. Government of the United Kingdom (GOV.UK) *General rules, techniques and advice for all drivers and riders (103 to 158)*. GOV.UK, 2015. https://www.gov.uk/general-rules-all-drivers-103-to-158/control-of-the-vehicle-117-to-126

29. Terry P, Wright KA. Self-reported driving behaviour and attitudes towards driving under the influence of cannabis among three different user groups in England. *Addictive Behaviours* 2005; **30**: 619-626.

30. BikeSafe. BikeSafe, 2015. http://www.bikesafe.co.uk/

31. Government of the United Kingdom (GOV.UK) *Enhanced rider scheme.* GOV.UK, 2015. https://www.gov.uk/enhanced-rider-scheme/overview

32. Isler RB, Starkey NJ, Sheppard P. Effects of higher-order driving skill training on young, inexperienced drivers' on-road driving performance. *Accident Analysis and Prevention* 2011; **43** (5): 1818-1827.

33. Jonah BA. Accident risk and risk-taking behaviour among young drivers. *Accident Analysis and Prevention* 1986; **18** (4): 255-271.

34. Holland C. *Older drivers: A literature review (No.25)*. DfT, 2001. http://webarchive.nationalarchives.gov.uk/20100202151748/http:/www.dft.gov.uk/pgr/roadsafety/research/rsrr/theme3/olderdriversaliteraturerevie4770

35. Office for National Statistics (ONS) *LC4109EW – Car or van availability by sex by age.* ONS, 2011. http://www.nomisweb.co.uk/census/2011/lc4109ew

36. Edwards JD, Lunsman M, Perkins M, Rebok GW, Roth DL. Driving Cessation and Health Trajectories in Older Adults. *Journal of Gerontology* 2009; **64** (12): 1290-1295.

37. Cumbria Road Safety Partnership (CRSP) *Mature Motorists.* CRSP, 2015. http://www.maturemotorists.co.uk/

12. Appendix 1

Driving limits for 16 drugs (from autumn 2014)[1]

Drug Type	Driving Limit
Illicit Drugs	
Benxoylecgonine	50 µg/L
Cocaine	10 µg/L
Delta-90Tetrahydrocannabinol (Cannabis and Cannabinol)	2 µg/L
Ketamine	20 µg/L
Lysergic Acid Diethylamide	1 µg/L
Methylamphetamine	10 µg/L
Methylenedioxymethaphetamine (MDMA - Ecstasy)	10 µg/L
6-Monoacetylmorphine (6-MAM - Heroin and Diamorphine)	5 µg/L
Generally Prescribed Drugs	
Clonazepam	50 µg/L
Diazepam	550 µg/L
Flunitrazepam	300 µg/L
Lorazepam	100 µg/L
Methadone	500 µg/L
Morphine	80 µg/L
Oxazepam	300 µg/L
Temazepam	1000 µg/L

[1] Department for Transport, 27 March 2014. https://www.gov.uk/government/news/public-approval-for-driving-limits-for-16-drugs

Centre for Public Health
Faculty of Education, Health and Community
Liverpool John Moores University
2nd Floor, Henry Cotton Campus
15-21 Webster Street
Liverpool
L3 2ET

Telephone: 0151 231 4542

Email: r.e.brown@ljmu.ac.uk

Website: www.cph.org.uk